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THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. I.—JULY 1st, 1859.

DEATH OF JACOB BELL.

The readers of this Journal will not be wholly unprepared for the intelligence it is our painful duty thus to communicate. Jacob Bell, the President of the Pharmaceutical Society, and the Editor and Proprietor of this Journal, died at Tunbridge Wells, on Sunday, the 12th of June. For eighteen years the part of the Journal corresponding to that in which this notice appears has, from month to month, contained a succession of editorial articles, which, with two or three exceptions, have all emanated from the pen of one individual; and these will form a lasting memorial of the disinterested zeal and unwearied devotion with which the best energies of a life, unhappily cut short in its prime, have been applied in the cause and for the benefit of those to whom these lines are addressed.

The Pharmaceutical Society, its rise and permanent establishment—the *Pharmaceutical Journal*, and the influence it has exercised in asserting and defending the rights of Pharmaceutical Chemists, in promoting the advancement of Pharmaceutical knowledge, and creating a bond of union among the members of the Pharmaceutical body—are facts for the realization of which we are mainly indebted to Jacob Bell.

The last number of this Journal concluded the eighteenth volume of the work, and in it the Editor intimated that a change would probably soon take place. Mr. Bell's health had long been declining; his naturally active disposition, and the enthusiasm with which he engaged in many public pursuits, caused him to overtax his physical powers, and thus was laid the foundation of a distressing complaint which deprived him of his voice, and rendered the act of deglutition a source of extreme suffering. Throughout life he had manifested a remarkable disregard of his own personal ease and comfort, especially when business of importance claimed his attention, and this, which almost amounted to a reckless neglect of the requirements of nature, was continued long after the commencement, and no doubt contributed to the aggravation, of his illness. His mental powers remaining unimpaired, and the disease, *Laryngeal Phthisis*, chiefly affecting the organs of voice, he continued to exercise his pen with unabated

energy when he could no longer take part in public discussions. His presence at the last Anniversary Meeting of the Pharmaceutical Society, on the 18th of May, affords striking evidence of his devotion to the interests of this Society, which continued to occupy his thoughts to the last hour of his life. But the change was now fast approaching. Distressed with hectic cough, feeble and emaciated to the last degree, and deprived, almost wholly, of the power of receiving nourishment in consequence of the agony attending the act of swallowing, he calmly applied himself to the preparations for his death. One of his last acts was the assignment of the copyright of this Journal to the Society at whose rise it was commenced, with whose progress it has been intimately associated, and in the interest of which it has ever been conducted. For some weeks before his death he resided at Tunbridge Wells, and there he fixed upon a spot for his last resting-place, beside the grave of the late Dr. Golding Bird. Having occasion to apply to the minister of the parish on this subject, he unexpectedly found in that gentleman an associate of his boyhood, the renewal of whose acquaintance contributed to render his last hours those of Christian peace, and assurance in a happy change. The instructions he left for his funeral were consistent with his unostentatious deportment through life. Small was the parade of ceremony, and few the followers to his grave, yet he had many true mourners, and of these not a few gave public expression to their feelings by partially closing their shops. This was especially the case among our Members in London, and, we believe, in most parts of the country. The Council and Officers of the Pharmaceutical Society were among those who attended, though uninvited, at the grave. They could not be restrained from thus following the last earthly track of him with whom they had so long laboured harmoniously, and to whom they were accustomed to look as to one capable of fulfilling the parts both of counsellor and leader.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*Continued*).

ELECTED IN JUNE.

MEMBERS.

LONDON.....Crispe, James.
SANDGATE.....Jenner, William Messenger
LLANGOLLEN.....Jones, Humphrey
IRONBRIDGE.....Smeeton, William

MAJOR EXAMINATION.

Dunhill, William Workman .....Doncaster
Fowler, Robert John .....Leeds
Hayward, Charles John .....Lincoln
Pearson, George Brigg .....Leeds
Raynor, John Charles .....Uxbridge
Richardson, Robert .....Ipswich
Roberts, Albinus John.....Horsham

MINOR EXAMINATION.

Austin, Henry Felix.....London
Briggs, John Aston .....Tipton
Clapham, Edward .....Leeds
Hartley, William .....Birmingham
Jones, Robert William.....Greenwich
Maudsley, William .....Preston
Videon, Charles.....London

REGISTERED APPRENTICES.

NAME.	RESIDING WITH	ADDRESS.
Conder, George	Mr. Smith	Walworth Road
Manby, Thomas	Mr. Chenery	Ipswich
Merrick, Charles James	Mr. Bateman	Manchester
Philpot, Arthur Walter	Mr. Wimble	Maidstone
Roberts, Charles	Mr. Handley	Wakefield
Shadford, Thomas	Mr. Shadford	Spalding
Vacher, Arthur	Messrs. Bullock & Reynolds	London

AT A MEETING OF THE COUNCIL, 1*st June*, 1859,

Present—Messrs. Bell, Bird, Bottle, Brew, Bucklee, Cupiss, Davenport, Deane, Hanbury, Herring, Lescher, Meggeson, Morson, Sandford, and Waugh, being the first meeting after the Anniversary, the following Officers of the Society were elected—

JACOB BELL.....President
THOMAS N. R. MORSON .....Vice-President
DANIEL BELL HANBURY .....Treasurer
ELIAS BREMRIDGE was also re-appointed...Secretary and Registrar.

The following resolution was carried unanimously:—

"That this Council having heard a proposition from Mr. Bell to present the Journal to the Pharmaceutical Society, receive the proposal with much favour, and beg to express their grateful thanks to him for the same, and will undertake to use their best efforts to carry it on with the same efficiency that has hitherto characterized its career, and in so doing to adopt his suggestions."

Tuesday, June 14*th.*

Some Members of the Council, hearing of the death of the President, met at the house of the Society, and addressed the following resolution to the brother of Mr. Bell:—

"The Council of the Pharmaceutical Society, hastily assembled on receipt of the melancholy intelligence of the death of the President, although unable immedi-

ately to express in suitable terms their sense of the loss the Society has sustained, lose not a moment in preferring their earnest request to his family that they may be permitted to evince, on the occasion of his funeral, their profound respect, in any way most congenial and gratifying to his family.

"To James Bell, Esq."

AT A SPECIAL MEETING OF THE COUNCIL, 16*th June*, 1859,

Present—Messrs. Bird, Brew, Bucklee, Deane, J. B. Edwards, Hanbury, Lescher, Meggeson, Morson, Sandford, Squire, and Waugh,

The following communication from Mr. James Bell was read:—

1, *Devonshire Place, Portland Place, June* 15th, 1859.

"Sir,—I beg to acknowledge the receipt of your letter enclosing the resolution of the Council of the Pharmaceutical Society respecting the great loss which our family has just sustained, and request you to convey to them our deep sense of the feeling of sympathy that they have expressed.

"I regret that in consequence of the instructions that my late brother has left respecting the funeral, it is out of our power to invite the attendance of the Council; at the same time we are desirous to leave it to the Members to act in any manner most congenial to their feelings on the occasion.

"I am, Sir, yours faithfully,

"E. Bremridge, Esq." "James Bell.

The Secretary was instructed to issue the following circular to the London Members, Local Secretaries, and as generally among the Country Members as the short interval would admit:—

"PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, 17, BLOOMSBURY SQUARE.

"*London, June* 16, 1859.

"Sir,—I am desired by the Council of the Pharmaceutical Society to inform you that the Funeral of the late President, Mr. Jacob Bell, will take place at Tunbridge Wells on Saturday next, the 18th instant, at 11 o'clock.

"The Council would respectfully suggest to the Members of the Pharmaceutical Society generally, that they should evince their respect for the deceased, and their deep sense of the loss the Society has sustained, by, so far as is compatible with individual convenience, partially closing their shops on that day.

"I am, Sir, your obedient servant,

"Elias Bremridge, *Secretary*."

PHARMACEUTICAL MEETING.

Wednesday, June 1*st*, 1859.

MR. T. N. R. MORSON, VICE-PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

The Journal of the Society of Arts, from the Society.
The Photographic Journal, from the Photographic Society.
The Journal of the Linnean Society, from the Society.
Quarterly Journal of the Chemical Society, from the Society.
Illustrations of the Nueva Quinologia of Pavon. By J. E. Howard, Esq., F.L.S., from the Author.
A Specimen of Sapo Venetus Verus, from Mr. Hanbury.
A Specimen of Austrian Rhubarb, from Mr. Daniel Hanbury.
A very fine Specimen of Hog-gum, from *Rhus Metopium*, from Mr. Bennett.
A Specimen of Sesquichloride of Chromium, from Mr. T. H. Baldock.

The following papers were read:—

CONCENTRATED INFUSIONS AND DECOCTIONS, LIQUORS, AND FLUID EXTRACTS.

BY MR. JACOB BELL.

While the British Pharmacopœia is under the joint consideration of the Medical Council and the Pharmaceutical Society, it would not be right to lose so favourable an opportunity of arriving at a definite principle respecting vegetable infusions and decoctions which from their liability to spoil by keeping are a source of some inconvenience, and have been the subjects of various experiments or innovations. Unless some uniformity of practice be adopted in reference to this class of medicines, a difference in the taste, appearance, and probably in the effect of those prepared at different places, is unavoidable. A patient having a prescription for a senna draught, knowing what are the ingredients, and taking it to be prepared at a shop in the country, may be startled at seeing the bottle filled up with water. Involuntarily he remarks, "I think that is not right; it should be infusion of senna," and the young man replies, "We use the concentrated infusion; I was only making up the quantity." "But are you sure the concentrated infusions are as good as the fresh?" "We think so; at all events, the difference, if there be any, is not enough to counterbalance the inconvenience of waiting; but if you prefer the fresh infusion, you can have the medicine in about an hour and a half." "Not this time, thank you. I am going by the train immediately, and wish to be provided with a draught."

In these few sentences, the case between the chemist and the patient is fairly stated. On the question of quality the patient is no judge; he must take on trust what he is told. He can judge of the inconvenience of delay, and is easily persuaded that the difference is not worth waiting for.

Between the medical man and the chemist the question stands on different ground. The inconvenience of waiting an hour, or several hours, for a medicine, is known and admitted. Yet in the face of this fact, which is undisputed, the Colleges of Physicians continue to order in the Pharmacopœia vegetable infusions and other preparations liable to the same inconvenience. There is, however, in the Pharmacopœia a general instruction to the effect that the chemist is at liberty to vary or improve the process provided the result be identical with that ordered and intended by the College. This privilege has been extensively acted upon with reference to vegetable infusions and decoctions, a variety of which preparations in a concentrated form are in constant use, each being recommended as being, when properly diluted, identical with the corresponding preparation fresh made. These concentrated essences, however, are not identical with each other, the process by which they are prepared not being officinal or known to the profession, but each maker adopts such method as his skill and experience may suggest; and some carry on an extensive trade in this class of preparations, which are, in fact, secret medicines purporting to be synonymous and identical with corresponding preparations in the Pharmacopœia.

Some difference of opinion exists as to the comparative merits of the concentrated and the fresh preparations, and the consequent propriety of substituting one for the other. The subject has been repeatedly discussed, and the result has usually been opposed to the innovation, yet some ingenious processes have been suggested, and clever papers written, with a view of surmounting the difficulty. Preparation in vacuo, percolation, the exhaustion of the ingredients by steam, spontaneous evaporation, and in most cases the addition of a certain proportion of rectified spirit, may be mentioned as the processes most generally recommended. The substitution of glycerine for spirit of wine as a vehicle has also been suggested, which is very objectionable, and none of these methods can be considered, according to the strict letter of the law, an adherence to the

instructions of the Pharmacopœia. Several discussions of the question, both in London and Edinburgh, have ended in a recommendation of the plan of bottling the infusions hot and carefully excluding the air, on the principle on which meat is preserved for travelling.

A correspondent in the Journal of last month suggested the plan of keeping infusions in bladders with stop-cocks, an idea anything but pleasant, especially in case a lady with a delicate stomach should happen to see in the back shop her aromatic infusion drawn out of the bladder of a pig!

This, however, does not solve the problem, whether it be desirable to keep and use these preparations, or any of them, in a concentrated form. If it be so, it would be better that the practice should be sanctioned by authority instead of being done *sub rosâ*, by the use of substitutes, the composition of which is known only to each respective maker. There may be some motive for retaining in the Pharmacopœia the old-fashioned vegetable infusions and decoctions for use in the fresh state, when convenient and practicable. Patients are not always in haste, the cases are not always urgent, and when time admits of the fresh preparation being made, there can be no excuse for deviating from it. If it be urged as an objection, that in case of emergency on another occasion the patient would observe a difference in the medicine made with the concentrated infusion, then the hypothesis of identity of result breaks down, for it is assumed that the substitution, if admissible, is on condition that the result is the same. Some responsibility also must rest on the prescriber, who, in a case of extreme haste and urgency, should order some medicine that could be had within a reasonable time in preference to one requiring six or twelve hours for its preparation. It is desirable that the custom adopted should be uniform, not only as to the cases in which the substitution of the concentrated preparation is admissible, but also as to the nature and composition of the said preparations. Any one who has examined specimens of this class of medicines by different makers, must be aware that they are not at all alike, some being much better than others, as the makers would testify if asked the question.

The same doubt and inconvenience formerly existed respecting the decoctions of sarsaparilla, and this was rather a serious obstruction to business on account of the time required for the preparation. Many varieties of concentrated decoction were in use before the practice was sanctioned on authority, but when the attention of the College of Physicians was directed to the subject, and the requisite investigations were completed, the introduction of the formulæ for fluid extracts removed all doubt and difficulty. These preparations are, in fact, superior on an average to the decoctions freshly made over a common fire, which may be easily shown by diluting a portion and comparing it with a similar quantity of freshly made decoction, when it will be found to possess the taste and other sensible characters of the drugs in a superior degree.

Liquor sennæ, liquor cinchonæ, liquor taraxaci, and other "liquors," are preparations of an analogous class, equally deserving of attention. They professedly contain the active principle of the vegetable—root, bark, leaf, &c.—in a concentrated form, free from the liability to change by keeping, which is the drawback on infusions and decoctions of the old sort. There is perhaps no preparation which differs more widely than the liquor taraxaci, which, although not an officinal preparation, is in very general use. Some prepare it by dissolving the solid extract in water and adding as much spirit as may be required to preserve it. This is a dark, sweetish compound, not quite so thick as treacle. Another process consists in expressing the juice, evaporating to two-thirds, making up the quantity with spirit, and filtering after the deposit has fallen. This is rather a strong *liqueur*, in appearance resembling sherry. Other varieties in tint, appearance, and strength are to be found, according to the discretion of the makers. This preparation, and several others of the class, are quite deserving of a place in the Pharmacopœia, and the free discussion and settlement of the entire question would put an end

to the inconvenience and perplexity which has for many years existed respecting concentrated infusions and decoctions.

ON CONCENTRATED INFUSIONS.

BY MR. A. F. HASELDEN.

So much has already been ably written, and so many opinions well expressed, both respecting the ordinary and concentrated infusions, that I should not have ventured upon so well-explored a subject had it not by others been again brought upon the tapis, but such being the case, it appears to me that each and every opinion which, by concurrence, tends to confirm the ideas of others, or by difference, opens afresh the fruitful field of inquiry, cannot be altogether void of interest or unworthy the attention of the members of the Pharmaceutical Society, or the large and influential body of Pharmaceutists not connected with the Society but who may take an interest in its proceedings, and read the Journal. Under this hope and conviction I am induced to offer the following remarks:—

Upon a very little consideration it cannot, I think, fail to be admitted that the infusions form a very useful and important part of the Pharmacopœia; but, as is the case with everything useful, there are certain drawbacks and inconveniences which it is most desirable, if possible, to ameliorate or remedy, the chief of which is their proneness to decomposition, and in warm summer weather this may take place in a few hours; secondly, the time required for their preparation; and thirdly, the necessity of a fire or boiling water at all hours. These circumstances render it almost impossible for a large body of Pharmaceutists who have not a rapid and continued demand for them, to employ them except in those cases where the necessary time can be allowed, but it often happens that this cannot be done, and the Pharmaceutist either loses his customer, which he is very unwilling to do, or substitutes something for the ordinary infusion of the Pharmacopœia.

As a remedy for this the concentrated infusions were introduced, and on many occasions, and under circumstances calling for such preparations, have often proved useful substitutes. Whilst admitting thus much on the score of utility and convenience, I am not prepared to receive them in place of the freshly-prepared infusions, or such as may have been made some time, if still sound. With great care and some management the concentrated infusions may be brought to resemble the ordinary in colour, bitterness, and general characters, but lack their naturally grateful qualities. The infusions are daily used in cases where the stomach, as well as the actual disease under treatment, requires an amount of consideration. They are continually employed where there is distaste for food, with loss of relish and appetite, and are required, as it were, to restore the tone of the stomach and prepare it for receiving its usual food, and enable it to perform its ordinary duties. Now, if you put into it any preparation in the shape of an infusion, which does not reach the standard of quality enjoyed by the delicate fresh infusion, it is but reasonable to infer that it is possible that the remedy may retard rather than accelerate the cure.

It has been urged in favour of the concentrated infusions that they can be prepared with greater uniformity. It is probable that in operating upon a large quantity a more uniform product may be the result; at least, the quantity either by measure or weight may always be the same, but when we think for a moment how the products of the vegetable kingdom differ in different seasons, and how prone preparations of them generally are to vary; when we observe the deposits continually occurring in highly concentrated spiritu-aqueous solutions (if I may use the term), whether as infusion, decoction, liquor, or essence; when we notice, as we cannot fail to do, the difference at present observable between these preparations made by different manufacturers, and supposed to be of the same relative strength and quality, and, indeed, in every way identical, the supposition that they would necessarily be uniform, appears to me to fall to the

ground, and vanishes at once, like the baseless fabric of a vision. It seems to me that there is precisely the same difference between a fresh and a concentrated infusion as would exist between a freshly prepared, grateful, refreshing cup of bohea and a given quantity of strong tea made hot as required by the addition of boiling water, or between the fresh hot infusion of recently roasted coffee, with its own delicacy and peculiar aroma, and the diluted manufactured essence.

There has been, and there is still, a strong leaning towards concentrated preparations of every form and description. A large body of Pharmaceutists (*et quorum pars fui*) seemed at one time to think that to concentrate was the height of ingenuity, utility, and profit. Experience has shown the vanity of the notion, and, as a rule, it should be discouraged rather than otherwise. It is not unusual, so much does the idea pervade all classes, for a patient to request that the medicine may be so concentrated that a *tea* spoonful may be taken instead of two *table* spoonfuls; and more than this, it is not by any means unfrequent to find a larger quantity of a salt prescribed in a small mixture or tincture than the fluid can by any possibility dissolve. The disadvantages in many ways of such a system must be obvious; indeed, so obvious as not to require any specific description. A hint may be given yet in good season. This concentrating system has been promulgated by the Pharmaceutists; they have inundated the medical profession with their concentrated infusions and decoctions, their essences, liquors, and fluid extracts. But to return to our infusions. Can nothing be done besides concentration to diminish the labour of continually preparing fresh infusions; the perpetual loss of time, material, and, in some cases, money? Several years since, and for a continued period, I followed the plan as explained by Mr. Stephenson in the May number of the *Pharmaceutical Journal*—namely, that of boiling the infusions in bottles and tying over with bladder, and can bear testimony to the fact of their preservation for a very lengthened period, but in the practical working of this plan several disadvantages presented themselves. In the first place, in order to avoid loss, it was difficult to decide upon the size of the bottle, because, a bottle when opened, if not wholly used, the remaining contents soon become worthless; thus, too large a bottle was inconvenient when a small quantity only was required, and, *vice versâ*, too small a bottle was equally so when a large supply was necessary; the remedy for this was, perhaps, different sized bottles, but the proportion of infusion ordered in mixtures is so varied, that a certain amount of loss in this way was inevitable. Again, bottles were continually flying from the heat employed in boiling, and if not thoroughly (by some accidental oversight) cleansed before being used a second time, a whole batch might occasionally be spoiled; and lastly, from some neglect in notifying that the last bottle had been used, there was still the liability of running out of a particular infusion, precisely at the time it was most wanted. I then argued with myself thus: if the addition of a certain portion of spirit was sufficient to preserve the concentrated infusions, why should it not have the same effect with the ordinary? The only reason I could see opposed to the use of it was the fact, that the spirit might be considered objectionable for the patient; but when we examine prescriptions containing infusions, we almost invariably find a very fair allowance of some tincture in combination. Although quite satisfied that infusions thus prepared could not be used unless formally introduced into the Pharmacopœia, I still thought it worth a trial, in the event of an opportunity occurring of introducing the matter. In pursuance of this notion, on the 1st of April, 1856, I prepared some infusion of senna in the ordinary way, and having strained it off, added in one case to every ounce one drachm of the tincture of senna, in another, to every ounce two scruples of the tincture; to the infusions of calumba, cascarilla, and orange, I added in one case one drachm of the tincture of each individual infusion, and in another, half a drachm only; infusion of roses and rhubarb I prepared similarly, but using rectified spirit. These preparations were then exposed in a window to the sun and light, and, without

exception, they were perfectly good upon the 17th of the month, and equally so when examined on the 16th of the following month, namely, May. For some considerable time afterwards I frequently examined them, until they were thrown away and the subject was dismissed from my mind, thinking that the tincture would be looked upon as an infringement which would not be yielded to, although I did not then, and cannot now, see any valid objection, as infusions are rarely prescribed where spirit and tinctures are entirely interdicted. The Pharmacopœia supplies us with two infusions where the addition of spirit is ordered—viz. digitalis and armoracia.

I selected the infusions here experimented upon because I considered them more likely to change than any of the others. Quassia, chirayta, cloves, and bark, keep a very long time, so that no one need really, under any circumstances, be without them. I should perhaps mention that the calumba had a cloudy deposit, but in other respects remained sound and good, retaining the bitterness in a remarkable degree.

18, *Conduit Street*, 30*th May*, 1859.

Mr. Waugh had for several years adopted the plan noticed by Mr. Haselden, of heating infusions to near their boiling point in bottles filled to the brim, then covering the mouths of the bottles with bladder, and keeping them thus excluded from the air, and he had found this plan to answer perfectly. In fact, the process and arrangement were so simple and so satisfactory, that he thought there was no excuse for using concentrated infusions, nor any necessity for altering the characters of the infusions at present ordered in the Pharmacopœia, and which had received the sanction of long experience. He might mention, in order to show how completely the method he had mentioned succeeded in excluding air, that after tying the bladder over the mouth of the bottle, and allowing the infusion to cool, on taking the bottle in the warm hand, the liquid would sometimes enter into ebullition. He did not think the objections urged by Mr. Haselden to this mode of keeping infusions were of much weight; on the other hand, he thought the plan suggested of adding spirit or tincture to infusions to preserve them was very objectionable.

Mr. T. H. Hills said it had sometimes occurred to him, since improvements had been effected in preparing infusion of coffee by a process of percolation which occupied but a few minutes, that probably a similar process might be made available for the preparation of medicinal infusions. He had tried some experiments with a French cafetière of very simple construction, and found the results to be satisfactory. He thought this was worth a consideration, as probably all infusions might be thus made by a uniform process that would not occupy more than ten minutes.

The Chairman thought the suggestion a good one, and the object a very desirable one to attain, if practicable. He believed the subject of infusions was referred to in other papers they had to read. In fact, there appeared to be several communications which had been received from different parts of the country, all relating to Pharmacopœia processes, and probably it would be the best plan to have them all read before discussing the subjects. If the time would not admit of discussion on the present occasion, the papers might be printed in the Journal, and the subjects discussed at the next meeting.

Mr. Francis thought it would be best to have the papers merely read this evening, and to take the discussion after Members had had an opportunity of reading them.

NOTES ON FORMULÆ CONTAINED IN THE PHARMACOPŒIA.

BY MR. BARNARD S. PROCTOR.

Acida.—Acidum Phosphoricum Dilutum. The formula for this preparation would be well replaced by one for diluting the glacial acid to any standard degree, placing the glacial acid in the materia medica list.

Decocta.—Decoctum Aloes Compositum would probably be in no respect injured by the omission of saffron, a costly and nauseous stimulant of questionable efficacy.

In the preparation of decoctions generally, greater uniformity would be obtained by making both the time of boiling and the quantity to be ultimately produced definite. For example, in preparing decoctum cinchonæ, say add water q.s., to replace what has been lost by boiling, so that if it has been reduced to one-half in one case and to three-quarters in another, the addition of the water will remove this source of variation. In the case of decoctum hordei, the opposite source of variation exists; it will sometimes get a much longer boiling before it is reduced to two pints than at another time. These objections apply with increased force to the preparation of larger or smaller quantities, as the length of boiling on the one hand, and the volume lost on the other, are materially influenced by the quantity operated upon. *Decoctum taraxaci.* The difficulty or impossibility of having fresh root always ready, makes it desirable to say dried taraxacum root. Though fresh is ordered, I have no doubt the dried is in a great majority of cases either unavoidably or thoughtlessly substituted.

Extracta.—The consistence to which extracts are to be evaporated is a matter capable of being more particularly defined with advantage. Some (aloes, colocynth, &c.) which may be dried without injury, and are not hygroscopic, would probably have the greatest number of advantages in being powdered.

Infusa.—Infusum gentianæ compositum, according to the present formula, is prepared with "lemon peel," the dispenser being left to his own judgment to decide whether it is to be fresh or dry, both conditions being acknowledged in the list of materia medica. According to custom, fresh should be used, but the order that "unless otherwise directed, vegetables are to be preserved dry," throws a doubt upon it, and countenances the more convenient use of the dry peel. I would suggest the propriety of deciding in favour of the dry. The gentian is ordered "concisa," a rather vague term, but no doubt intended to express a very rough state of comminution. If it were ordered in coarse powder, the length of maceration might be reduced to a quarter of an hour (the time required for infusum aurantii), which would greatly facilitate its being prepared fresh when required, and reduce the temptation to substitute a concentrated preparation. I think this object should have special consideration, and experiments to reduce the time of maceration in all cases to its shortest duration. For instance: buchu bruised, ½oz., hot water ½ pint, infused for a quarter of an hour, gave an infusion a little turbid, darker coloured, with stronger odour and taste than that prepared with the same proportion of the whole leaves and macerated five hours. The degree of comminution found advisable might be expressed as "powdered," "roughly powdered," "bruised," or "sliced," and the exact meaning of these terms defined in the general directions, thus: powdered, is to be understood so fine as to pass through a sieve, the meshes of which are 40 × 40 or more to the square inch; roughly powdered, that which will pass through a sieve 20 × 20; bruised, that which will pass through a riddle the perforations of which are one-fifth or one-sixth of an inch in diameter; sliced, cut transversely in sections not more than ¼-inch thick. If my ideas upon the reduction of the time of maceration do not meet with approval, I still think the subject of comminution is one that requires attention.

Linimentum Ammoniæ.—This preparation is often troublesome on account of the variable nature of olive oil, even when purchased from dealers of the highest reputation, and bought as "Ol. Oliv. Opt." it will sometimes give a thick, soapy mass, which will not pour out of the bottle, and at other times is very imperfectly saponified. I have found almond oil more uniform, and would suggest its use. Though less perfect combination is obtained, it is always free from the objection that it will not come out of the bottle when wanted.

Vinum Ferri.—If retained this should be of uniform strength, prepared with ferri ammonio-tartras or ammonio-citras rather than the potash salt of iron, which

is less uniform and permanent, though even it is better than merely trusting to the acidity of the wine.

Mistura Cretæ.—The quantity of mucilage is much too small to be of any use ; two or three times the quantity would be better.

Pilulæ.—Pilula aloes composita and pilula aloes c. sapone are not quite satisfactory preparations. The former is apt to lose its shape when made into pills ; the latter is too soft without the use of treacle, and has unnecessary bulk given to it by the liquorice. A desire is frequently expressed by the patient to have pills made as small as possible. I think we should attend to this desire as far as practicable consistently with the necessary qualities of the mass. With this object I would suggest the propriety of discontinuing extract of gentian in pilula aloes composita, extract of liquorice in pilula aloes c. sapone, cardamoms in pilula colocynthidis composita (and probably placing oil of cloves in its place), myrrh in pilula galbani composita and in pilula rhei composita. The tendency of pills to lose their shape is perhaps below the notice of the Physician, but the Pharmaceutist finds it a matter which he must attend to; and to effect a sufficient firmness, together with ready solubility, *hard* soap is a most useful addition ; I find it better than soft. I think the quantity used in pilula colocynthidis composita and pilula rhei composita should be much increased.

Pulvis Cretæ Compositus is often complained of by the patient as being so unwilling to mix with water. The quantity of gum it contains is much too small to be of any use. I suggest that it would be better omitted, and that 5 per cent. of carbonate of potash (not bicarb.) be added. This addition does not give it a tendency to become wet, even if kept a week or two in a damp place, and is sufficient to make it mix readily with water.

Spiritus.—Spiritus anisi, carui, cinnamomi, menthæ, pimentæ, pulegii, rosmarini. These preparations are very little in use, probably because they are so feeble ; the desire for more active preparations is shown by the constant demand for essentia menthæ, essentia anisi, &c., which might advantageously replace the others if prepared from authorized formulæ.

Syrupus Zingiberis.—The infusion for this syrup is inconveniently prepared with boiling water. An improvement might be found in the use of cold water, or the syrup might be made with strong tincture of ginger added to simple syrup.

Tincturæ.—Tinctura Cardamomi Composita. It is to be hoped that raisins will not be any more used in this tincture. Tinctura Cinchonæ Composita. The removal of saffron and cochineal from this formula would be no loss to the preparation, and a gain to the Pharmaceutist. Tinctura Iodinii Composita is better prepared with proof than with rectified spirit. Tinctura Rhei Composita. If liquorice is to be retained in this formula, the propriety of using the extract instead of the root is worthy of consideration. As a rule (perhaps not without exception), it is better to see preparations have the natural colour of their active ingredients, and here, as elsewhere, I think saffron had better be expunged. Tinctura Sennæ Composita. Omit the raisins. Tinctura Zingiberis. A formula for a stronger tincture than the present might be advantageously added, as "essentia zingiberis" is not only a common domestic remedy but occasionally prescribed by M.D.s. It also affords a good means of making syrupus zingiberis. See above.

Unguentum Iodinii Compositum. Water is better than spirit for dissolving the iodine and iodide in this ointment.

11, *Grey Street, Newcastle-on-Tyne.*

NOTES ON A FEW PREPARATIONS OF THE PHARMACOPŒIA, &c.

BY MR. THOMAS SOUTHALL.

Emplastrum Belladonnæ.—I have pointed out (*Pharmaceutical Journal*, vol. xv., page 351) the advantages of having this plaster prepared with an alcoholic extract of belladonna, and they are confirmed by further experience.

Emplastrum Opii.—The use of extract of opium in making this plaster appears to me to be a refinement which is not needed in an external application. Unless there was some obvious advantage connected with it, the great increase of expense in the preparation should be avoided. It has prevented the adoption of the new formula to a great extent, and our demand for the article is chiefly the old kind.

Pilula Ferri Composita.—In making this compound, the sulphate of iron and carbonate of soda should be first rubbed together. Sulphate of iron, which will keep its colour, necessarily contains a portion of uncombined acid, and in mixing it with carbonate of soda a considerable portion of carbonic acid is evolved. If this is not allowed to pass off before the other ingredients are added, the mass becomes porous, and consequently spoils by exposure to the air; but if the foregoing direction is attended to, the mass or pills made from it will keep good for months if not years. There is no objection to a warm mortar being used if thought needful.

Pilula Rhei Composita.—I think the Edinburgh formula is entitled to preference in the British Pharmacopœia, from having been first in use. It was so much in demand in our neighbourhood, before the London College adopted it, that we have never felt at liberty to depart from the original formula. The change attempted to be introduced into its composition by the substitution of oil of caraway for oil of peppermint, has, I think, had a tendency to lessen its use, and has been very inconvenient.

Liquor Taraxaci.—Few vegetable preparations are more in demand than liquor taraxaci. A good formula for its preparation is given in vol. ix., page 343, of the *Pharmaceutical Journal*. Persons who have had more experience than myself may probably be able to state at what period of the year the product is most satisfactory. The quantity of juice is certainly less, and the proportional deposit much greater, in autumn than in spring or the early part of summer, with no increase of strength, so far as I can judge. Even with twenty-five per cent. of spirit, liquor taraxaci gradually loses its bitter by keeping.

Syrupus Cocci.—I have not known this syrup prescribed, and was not aware it was in the Pharmacopœia till two or three days since. I suspect it would become very putrid in a mixture containing no spirit. Probably this might be prevented by extracting the colour of the cochineal with cold *very diluted* sulphuric acid, and afterwards saturating with potash.

Syrupus Mori.—The following process greatly improves this syrup. Heat the juice to the boiling point to separate the albumen; when cold, filter, and add the sugar, dissolving by heat. Thus prepared, it is a beautiful transparent syrup.

Syrupus Aurantii, Syrupus Zingiberis.—In making these syrups I would suggest that the spirit should be used to extract the virtues of the solid ingredients, which are much more soluble in that menstruum than in water.

Tinctura Ammoniæ Composita.—Might not this rubbishy formula be expunged?

Tinctura Cinnamomi, Tinctura Cinnamomi Composita.—Both these tinctures are liable to become muddy by keeping. Would not the substitution of cassia for cinnamon be an improvement? Cinnamon appears to have a great tendency to change in nearly all its liquid preparations.

Tinctura Iodinii.—A saturated solution of iodine in rectified spirit is often required as an escharotic, and medical men are disappointed in the effects of tinctura iodinii composita if used for this purpose.

Tinctura Quinæ Composita.—Would there be any objection to facilitate the solution of quinine by the addition of a *little* sulphuric acid?

Extractum Colchici, Extractum Colchici Aceticum.—In both these preparations the starch should, I think, be allowed to subside.

I have been induced to turn my thoughts in the following direction, in consequence of a remark made at the Pharmaceutical meeting on the 3rd of

February, by Dr. F. J. Farre, to the effect that a note might be appended to the formula for spiritus ammoniæ aromaticus, stating that the spirit is liable to become coloured by keeping.

It is probable that our continental neighbours pay too much attention to what may be termed the minor, or less important characters of medicinal preparations, and may thereby justly incur the charge of spending their ingenuity upon trifles. Nevertheless, I hope that in the forthcoming Pharmacopœia these minor particulars will not be neglected, but that even in them perfection and excellence will be aimed at, however far we may be from attaining it.

It should, I think, be considered a *defect* in a tincture, a syrup, a honey, or an oxymel, to be otherwise than perfectly bright. In a distilled spirit to be coloured or muddy. In an extract to become mouldy, or to be lumpy (and green extracts will certainly be lumpy if the chlorophyl is evaporated with the juice). In confections to be rough or to become candied. In a pill mass to crumble with pressure, or in pills to lose their form. Decoctions and infusions, the medicinal qualities of which are soluble in cold water, should be clear. Those who remember the practice of bruising sarsaparilla root for decoction after it was softened by boiling, must look back upon it with disgust, but there is much yet to be learned before many of our preparations are perfect. I hope, however, every successful attempt to remove defects and to produce a perfect preparation will be recognized as a step forward, though I would by no means recommend that attention to these minor considerations should in any case interfere with those of greater importance.

The province of the Physician and the Pharmaceutist in determining the processes and formulæ of the Pharmacopœia, is, I think, separated by a pretty clear line of demarcation, and I should be glad to see all the skill and experience of the Pharmaceutists of this country exercised in the part which rightly devolves on them.

I may acknowledge that I feel rather disappointed that no mention has been made in the Journal of contributions to the work from many experienced Pharmaceutists, who are in a position, I should suppose, to lend a helping hand.

I do not know to what extent the College of Physicians has hitherto been responsible for the doses attached to preparations in their authorised translation, but the subject is, I think, one of considerable importance.

In the Pharmacopœia of 1836 the proportion of jalap root to proof spirit for tincture was 10oz. to oij., and in 1851, the quantity of jalap was reduced to 5oz., yet in Phillip's Translation the dose is in each case the same. A similar oversight does not occur with regard to simple extract of colocynth, which in Phillip's Translation for 1836 is directed to be given in the dose of 10 grains to 30 grains, and in 1851, from 5 grains to 20 grains, but the strength of the extract of 1851 is such that few persons would like to repeat the minimum dose of 5 grains, and 20 grains would, I think, in some cases be dangerous. When an important alteration is made in any formula, special attention should, I think, be directed to it.

ON THE PILULÆ OF THE LONDON PHARMACOPŒIA.

BY MR. J. BOUCHER.

Perhaps one of the most neglected portions of our present Pharmacopœia is its pilulæ. No delicate chemical changes in preparation or uncertainty in composition exist to attract either scientific or practical discussion to them. By the prescriber they are invariably considered a bad form for exhibition unless where nauseous or repulsive medicines are required to be administered; the Pharmaceutist finds them the time-absorbing, profitless pests of his establishment, whilst the dispenser also feels equally warm in his dislike for them, which feeling is modified only by the consolation that their physical characters never vary; they will bear any amount of scrutiny without the detec-

tion of a shade of difference in colour, and the invalid's delicate palate will be expended here in vain—he never tastes pills; the dispenser, therefore, imagines that anything will do for these troublesome compounds. Such is, however, not the case, nor does there exist any reason why attention should not be directed to these preparations.

A good pill mass, as stated by one of our most competent lecturers on Pharmacy, "should be of a perfectly even consistence; when cut through, should present a uniform appearance without any observable difference in colour or laminæ; should be sufficiently hard to preserve a nicely rounded form when made into pills, and sufficiently soft to be readily taken up by the fluids of the stomach. It should not be so unyieldingly elastic as to refuse to be moulded into any shape the operator may think fit, nor delude him to imagine he has rolled a lot of round pills when, on further examination, he finds them ovals, but should possess a degree of tenacity sufficient to preserve them even when tolerably dry from falling to powder." Nevertheless, to secure these qualities much practical experience is required to indicate what vehicle will answer best for mixing up the particular substance under notice. I am not aware of any one thing that will fulfil the desired end in every case; even that beautiful mixture of soft soap and treacle will fail occasionally.

In the present Pharmacopœia the required conditions are fulfilled admirably in some instances, in others but very imperfectly. The pilula cambogiæ composita and pilula hydrargyri chloridi composita, are examples of this. Scarcely ever are these two substances found in a fit state to be rolled into pills after having been made for a short time. There are others which I submit might be greatly improved by the slightest modification in the process employed, and by the vehicle used in their manufacture.

I would therefore propose to divide the pilulæ of the Pharmacopœia into two classes—first, those to be prepared by mixing together the ingredients in powder, if admissible, with the soap or treacle, or whatever may be indicated by the present formulæ, and adding thereto sufficient water to form a thin paste, afterwards evaporating the mixed materials by the heat of a water-bath until a fit consistence shall have been obtained. A slight modification to the foregoing process will be required for those masses containing volatile oils, &c. This is substantially the method adopted in many leading houses at the present time with admirable results. Second, those prepared by beating the ingredients together in the ordinary way as now directed. Under the first head I would place the following:—

Pilula Aloes Composita.—Prepare this by mixing the aloes in powder, extract of gentian, and treacle, with sufficient water to form a paste, and evaporate by a water-bath as above indicated to a proper consistence, then, when the pill is beginning to cool, stir in the oil of caraway.

Pilula Aloes c. Myrrha.—Prepare as above.

Pilula Aloes c. Sapone.—Prepare as above. Treacle is ordered in this formula to be added in sufficient quantity; it would evidently be preferable to name a fixed weight instead, for, as will be perceived, none would be necessary to reduce the mass to a pill consistence, being even without it, when soft soap is used, too soft to preserve the pills from running together.

Pilula Cambogiæ Composita.—Prepare as directed for *pilula aloes composita*. Although when recently prepared by the Pharmacopœia process, this mass seems to possess all the necessary qualities for use, still it soon loses its adhesive properties, and has either to be rebeaten with a fresh quantity of soap or rejected entirely. It is, however, not much used now.

Pilula Colocynthidis Composita.—Prepare as *pilula aloes composita*, mixing in the cardamoms towards the end of the evaporation, when in the last named pill the oil of caraway is ordered to be added. Many prescribers are in favour of the extract of 1838 in lieu of this.

Pilula Galbani Composita.—Take of myrrh, galbanum, sagapenum, and

asafœtida, of each quantities equivalent to those at present ordered; macerate at a gentle heat in sufficient water, and strain through muslin, then the soap and treacle being added, evaporate to a proper consistence.

Pilula Rhei Composita.—Prepare as *pilula aloes composita*, stirring in the oil at the end of the process.

Pilula Styracis Composita.—Prepare as *pilula aloes composita.*

The before-named comprise the pill masses, which I feel convinced would be improved by adopting this method, which has also another advantage, that of requiring considerably less manual labour in its performance. In illustration of the advantage of the process I recommend, I would refer to *linimentum hydrargyri.* With all the rubbing, beating, mixing, and mechanical exertion the most vigorous arm could apply, it will still remain a mixture disposed to separation almost immediately; but take this same mixture, apply a gentle heat, and an entirely different result will present itself. We have now a thick even liquid, retaining when cold the same properties; we have, in fact, not a mixture, but a thorough combination.

The pill masses of the second class I shall have but few remarks to make on; they are—

Pilula Conii Composita.
" Hydrargyri.
" Ipecacuanhæ c. Scilla.
" Scillæ Composita.

} The instructions given, as well as the methods of keeping these masses, are all that can be desired, the pilula hydrargyri being generally prepared on a very extensive scale, well mixed, and genuine.

Pilula Ferri Composita.—As frequently met with, this pill possesses an undue amount of hardness, for which, however, there is no necessity, for if the decomposition of the iron be thoroughly completed, which is readily done by heating the mortar to 212°, the mass will have a good consistence, and retain it for some time, yet it is preferable not to keep this pill for too long a time, in order to prevent in some degree the iron from becoming peroxydized. I have been in the constant habit of replacing the treacle by sugar here, with, I think, great advantage, the sugar exerting an equal, or even superior preservative influence on the iron, and admirably fitting it in all its properties for administration.

Pilula Hydrargyri Chloridi Composita.—Few things can be more troublesome than this to roll into pills when made up with treacle as directed. The only substance I have found to answer the desired end is castor oil, with which they will not only keep their original form, but remain soft for an unlimited period.

Pilula Saponis Composita.—This mass is much too soft to form pills, and 15 to 20 per cent. of its moisture must be evaporated to obtain a good consistence. If something were not added to compensate for this loss of water, the preparation would as a necessity contain too much opium to the extent to which water is driven off. It would be far better to use the hard soap ordered in the former Pharmacopœia in place of the soft soap now ordered.

These comprise the whole of the pill masses; and, in conclusion, I would remark, it is often a convenience to have the pill in a state of powder. As this form, in many instances, is obtainable, it would be well, in cases where thought desirable by the Pharmacopœia Committee, to make provision for it. Pilula colocynthidis composita, pilula rhei composita, pilula hydrargyri chloridi composita, &c., are now often kept in this state as well as in mass. I may also add that glycerine has been much recommended in pill making, and doubtless, like many other unnamed substances, has its place, but I know of no special advantage it possesses over the means we already have, and besides this, it is considerably more expensive—a circumstance which should always be attended to in the construction of formulæ for the Pharmacopœia.

4 *and 5, Union Street, Bristol.*

REMARKS ON SPIRITUS AMMONIÆ AROMATICUS.

BY MR. C. R. C. TICHBORNE.

The disparity in composition which the three Pharmacopœias exhibit in this article is greater than at first sight strikes the eye. It is but one of the many cases of dissimilarity presented by these works, which in some of the other preparations must have produced serious results; but *tempora mutantur*. If we compare the methods directed to be followed by the three colleges, we shall find little analogy. Thus, placing them in juxta-position, we shall find that in about three pints, the formulæ contain respectively—

L. PH.	D. PH.	E. PH.
Rectified spirits (=Oiij. sp. specific gravity about .900) Oij. water Oij.	Rectified spirits, Oij. ℥xiv.	Spirits of ammonia, Oij. ℥xvij. ʒv. ♏lvij.
Chloride of ammonium, ℥iij. Carbonate of potash, ℥v.	Solution of ammonia specific gravity .900 ℥v. ʒiij. ♏xij.	
Aromatics in their primitive form, ʒxxss. Specific gravity, .918	Aromatics in the form of volatile oils, ʒv. ♏lj. Specific gravity .852.	Aromatics in the form of volatile oils, ʒxviij. ♏iij. Specific grav. about .846

We find that the proportions of absolute alcohol run as follows:—L. Ph., about ℥xxxiijss.; D. Ph., about ℥xxxxjv. ʒvj., and the E. Ph. a little above the latter. The ammonia is in the form of sesquicarbonate in one, and in the caustic form, varying eccentrically, in the other two, whilst the aromatics in the E. Ph. are about equivalent to quadruple those of the London Ph.

In looking over the processes, we find that in the D. Ph. distillation is not used, and although the product is not equal to the others in appearance, I think it has one advantage which ought not to be overlooked—that is, the facility it offers to the Pharmacopolist to make the article for his own use, a consideration to be held in view in all the processes introduced into the Pharmacopœia, so that the apothecary may become more independent of the manufacturer. There are hundreds of Pharmacopolists who make their own articles as far as the appliances go, but are prevented by circumstances from using distillatory or other apparatus. The product of the present Dublin formula is open to serious objections. When first made, it is decidedly coloured from the use of a certain oil, which becomes darkened by the action of alkaline substances; nor is this coloration lessened by the action of the sun's rays, added to which it lacks the sweet saline piquancy gained by the introduction of sesquicarbonate of ammonia. In preparing a formula, such an oil as cinnamon or clove is inadmissible, from its property of becoming tinged when in contact with ammonia; but by avoiding such oils, we may get a solution which is not only perfectly colourless but will remain so for an indefinite period. The following, or a similar formula, will give the desired results:—

Rectified spirits, Oj. ℥xiv.
Sesquicarbonate of ammonia, powdered, ℥ss.
Solution of ammonia, sp. g. .880, ℥ij.
Oil of lemon, ʒiij.
Oil of nutmeg, ʒj.
Oil of lavender, ♏xx.
Water, a sufficient quantity to make Oij.
Specific gravity, .870

Oil of rosemary may be substituted for the lavender, but I think the flavour of the latter would be preferred.

Laboratory, Apothecaries' Hall of Ireland, Dublin.

The usual hour for adjournment having arrived, the further consideration of these papers was deferred to a subsequent occasion.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Fifteenth Meeting of the Session was held in the Royal Institution, Colquitt Street, May 26th, 1859;

THE PRESIDENT IN THE CHAIR.

The Secretary announced several donations to the Library and Museum, amongst which was the Austrian Pharmacopœia, from Daniel Hanbury, Esq., London.

A discussion on the new Pharmacopœia and the weights and measures was again brought forward. The meeting appeared to be almost unanimous in deprecating any alteration in the value of the grain weight, as such alteration would be likely to be productive of great inconvenience and confusion in dispensing, nothing being more mischievous than altering the value and still retaining the same designation of a weight or measure. The unanimous opinion of the meeting was in favour of a decimal system, and until such be introduced and legalized by Act of Parliament, it was considered desirable to use the avoirdupois weight from one ounce and upwards, and the apothecaries' weight below one ounce.

In accordance with these views, Mr. Abraham moved the following resolution:—"That the Chemists' Association are strongly of opinion that avoirdupois weights ought to be adopted in the new Pharmacopœia, but that the value of the grain weight ought not to be altered, and that the sign ℈j., ʒj., ℥j., should represent respectively, as hitherto, 20grs., 60grs., and 480grs.

Mr. Shaw seconded the motion.

Dr. Edwards moved an amendment: "That on the ground of the immovable unanimity of the Medical Colleges, despite the remonstrances of the Pharmaceutical Society, it is not desirable further to communicate with the Pharmacopœia Committee;" which, not being seconded, the original motion was carried.

Mr. Abraham proposed, and Mr. Walker seconded, "That the above resolution should be forwarded to Professor Christison;" which was agreed to.

Mr. H. S. Evans read a short paper on "Microscopic Research," and, after a vote of thanks to the lecturer, the meeting separated.

Royal Institution.

The Sixteenth Meeting of the Session was held on June 9th;

THE PRESIDENT IN THE CHAIR.

The Secretary announced some donations to the Library and Museum, after which the President suggested that a formula for Tr. ferri. acet. æther in the new Pharmacopœia was very desirable, it being often prescribed by the profession, and the preparation obtained from different sources not being uniform in strength and appearance.

REMARKS ON THE RHIZOMES CALLED ZERUMBET AND CASSUMUNAR ROOTS.

BY PROFESSOR T. C. ARCHER,
Queen's College, Liverpool.

My attention has lately been called to an importation which arrived in this port in the month of March last. It consisted of nearly two tons of an article called by the importers *Kutchoo*. Upon examination, I found the packages contained apparently two kinds of rhizome, one round in form, and not unlike zedoary, the other resembling ginger, but not quite so much flattened; both were exactly like ginger in the external colour; internally, they were of a dark greenish brown, and possessed a fine aromatic camphoraceous taste, with a slight degree of bitterness.

The round variety in every essential particular agrees with the cassumunar root referred to by Pereira under the head of Zingiber Cassumunar, *Roxburgh*. The long and thin variety as closely resembles the *Zedoaria longa* of the same author, described under Curcuma Zedoaria (*Pereira's Materia Medica and Therapeutics*, vol. ii. part 1).

From the admixture of both sorts in the same bags, their perfect similarity in sensible qualities, and from the still stronger proof that plenty of specimens were present, showing fractures on the sides of the round rhizomes exactly such as would

be found had the long ones been broken from them, and some also in which portions were still left, identical with them, I feel perfectly satisfied that they are the produce of the same plant.

I think, also, that they are derived from the Curcuma Zerumbet of Roxburgh, and not from his C. Zedoaria. My grounds for this opinion, I confess, are slight; they rest chiefly upon the native name under which the article was imported—viz. *Kutchoo*. This so nearly resembles the Dukkanhie name of *Kutchoor*, by which it is known in the Indian bazaars, that it forms at least a reasonable excuse for the opinion I have advanced. The Arabic and Persian name for the same plant *Zerumbad*, is also another reason. According to Ainslie, the Hindoos of Upper Hindostan called the root *Capur Huldie*, which signifies that it smells of camphor, of which it both smells and tastes very strongly. The following description of the root of Curcuma Zerumbet, by Geoffroy, also strikingly accords with the characters of these rhizomes except in the internal colour, "intus candida," which may, however, have arisen from the examination of a recent root instead of a dried specimen, as all the turmerics become much darker in drying. He says: "Foris cinerea, intus candida, sapore acri, amaricante, aromatico, odore tenui, fragrante, ac valde aromaticam, suavitatem cum tunditur aut manducatur spirante, et ad camphoram aliquatenus accidente." Few subjects in Materia Medica have been more puzzling than the determination of the products of the natural order Zingiberaceæ, and more especially those referred to in these remarks, but I now feel sure that these rhizomes, hitherto believed to be the produce of two different plants, are, in fact, only different parts of the same, and that Cassumunar root is only the central root-stock of Curcuma Zerumbet, and that Zerumbet roots are its lateral offsets.

At a Meeting of Council of the Liverpool Chemists' Association, held June 22nd, the following resolution was unanimously adopted:—

"That this Council earnestly desire to sympathize with the family of the late Jacob Bell, Esq., in the bereavement which they have sustained by his death, and at the same time to record their high sense of the very important services which he has rendered to the cause of Pharmacy during the last twenty years."

The Seventeenth and last Meeting of the Session was held June 23. A report of the proceedings will appear in the next Journal.

ORIGINAL AND EXTRACTED ARTICLES.

OBSERVATIONS ON A PROPOSED ADJUSTMENT OF WEIGHTS AND MEASURES FOR THE NEW BRITISH PHARMACOPŒIA.

BY CHARLES WILSON, M.D.,

Fellow of Royal College of Physicians, and Vice-President of Medico-Chirurgical Society of Edinburgh, &c.

It need scarcely be necessary to do more than refer the readers of the *Pharmaceutical Journal* to the subject of Weights and Measures in Pharmacy, as it has been discussed in the numbers for May and June of that Journal, in order to justify a desire, which has not only been felt by myself, but has been urged upon me by others, that a more full explanation than has hitherto appeared in these pages should now be given of a plan which has been recently proposed for the adjustment of our medical metrology; a topic at all times of great interest and importance, but which has at present been rendered especially opportune from the contemporary progress of the arrangements for the publication of a new British Pharmacopœia, designed to serve as the sole rule henceforward throughout the Empire.

If it can be shown that the existing system of medical weights and measures is one which, either owing to defects inherent in itself, or engrafted upon it through external encroachments, has become liable to many serious objections, there can be no doubt that just complaint might be urged against the General

Medical Council, acting under the recent enactment for the regulation of the medical profession, were they to demit that power of adjusting and defining these weights and measures which has been there expressly committed to them by the State. Manifestly, also, if any change be necessary, it should be effected now, when, in bringing the Pharmacopœias of the several divisions of the empire into harmony with each other, and the whole into a just relation with the progress of knowledge, and the demands of the time, so many other alterations must compulsorily ensue, the introduction of which would largely facilitate whatever adjustments it might be found advisable to associate with them. While thus performing the inevitable duty of first determining which of several conflicting modes of compounding a formula shall be the rule for the future, or whether the whole of these ought to be modified, or superseded, or abandoned, or what entirely new formulæ, either in arrangement or in ingredient, shall be introduced, the element of an alteration in the weights and measures, by which their proportions are to be combined, falls easily into an integral part of the labour; and the strength of the preparations, with the due correspondence of the various constituents, will be regulated accordingly and at once. Thus the whole would be accomplished as one effort by the compilers, and learned afterwards as one lesson by the druggist and the practitioner. It would be widely otherwise, however, if all other differences were reconciled, and all other points of change or arrangement determined now, and that of systematizing and simplifying the weights and measures were merely postponed. Instead of a single process of change, which a great object of national union has rendered to a wide extent imperative, and which should be rendered simultaneously complete if we would wisely escape from those minor disturbances which, under the general adoption of the new system, might be rendered almost imperceptible while they were felt to be necessary, we should then become needlessly subjected to the risk of a new subversion and of new distractions at some uncertain period; and these, though proceeding from an individual cause would be sufficient to annul much of the labour, and revive most of the inconveniences, of the former comprehensive change, with the additional painful reflection that they had been gratuitously encountered, in so far as that a little timely prudence might have anticipated and prevented them.

Assuming it, then, as beyond dispute, that if a change in the weights and measures be found necessary, it can be best made as part of that other more comprehensive change which circumstances have rendered inevitable, it remains only to be seen whether there is anything in existing relations which can recommend it as prudent otherwise in the judgment of those to whom the credit of a profession, and the safety of the public, must rank as first conditions, or, in other words, in that of the whole of the united departments of medicine. It is no reproach to any of our present race of Chemists and Druggists, that the system of troy weights, with that modified subdivision of the ounce which has been specially designated as apothecaries' weight, originally enjoined as that alone authorized for use in their shops, should have been in great measure abandoned, while that of the avoirdupois weights has been largely substituted in its place. How and when this infringement of rule first glided into use, it will now be difficult to determine: but it was to have been foreseen, as a natural result of the universal adoption of the avoirdupois system by all the commercial classes of the country; and it must have been almost forced by the merchant or importer upon the wholesale Druggist, who, again, for an obvious convenience, would be not less willing to impose it upon those who purchased from him, and who were engaged in the retail of medicines. It has unfortunately ensued, however, as a consequence, that two systems of weights, not only differing from each other, but conflicting and alternating singularly in the values of their similar denominations, came into simultaneous use in the shops of the dispensers of medicines; and a larger avoirdupois pound, with a smaller troy pound, to contrast with a larger troy ounce and drachm, placed, again, beside smaller avoirdupois weights

having coinciding designations, stood side by side on the same counter. It was necessary to escape, at least in part, from the intolerable confusion thus originated; and the natural tendency with the Druggist, as it would have been with every other class of dealer, was to seek his refuge by gradually leaning to that description of weight which, setting aside the seldom required pound, not only enabled him to sell a smaller quantity under a like denomination, but was identical with that by which he had himself been constrained to make his own purchases. Thus the custom grew up of retailing all quantities of medicine exceeding, or amounting to, a quarter of an ounce, by avoirdupois weight only; a contravention of the originally prescribed usage which seems to have been already widely prevalent a century and a half ago, when the excellent treatises on weights and measures by Bishop Hooper and Dr. Arbuthnot were published, and which may be safely said to be universal now.

Meanwhile, the requirements of medical practitioners still compelled a continuance of the preparation of prescriptions, according to the authorized troy or apothecaries' weight. But with the preparation of the fundamental formulæ in the Pharmacopœias it was soon found to fare differently. The larger denominations of troy weights having actually disappeared from many establishments, and fallen into total disuse in many others, comparatively few Druggists were left who complied with the directions of the Colleges in compounding their Galenical preparations directly by these weights; by far the greater number adopting a process of transmuting the quantities so as to express them in the avoirdupois weights which were now universally in their possession, and thus proceeding to complete their office upon this, in so far, arbitrary method of their own. That so extreme a point, in such a matter, was thus easily reached, was but part of the general tendency evinced by the Druggists to verge into the adoption of the avoirdupois weights, under the common impulsion which we have indicated. These facts premised, we best sum up the results by recapitulating, that thus three different systems became contemporaneously established in their laboratories. By the first, they made all their purchases, and retailed all their wares, when amounting to a quarter of an ounce in quantity or upwards, according to the avoirdupois scale; by the second, they dispensed prescriptions, merely a restricted form of sale, not in conformity with the weights by which they had made their purchases, but according to the troy or apothecaries' standard; and by the third, they mingled the two, receiving the directions in troy, and transmuting them for execution into avoirdupois.

These accumulating changes were not likely to be either unobserved or unresisted by the Colleges of Physicians. It was not necessary for these bodies to inculcate here a duty among themselves, through any appeal to the earnest straining of all nations, and throughout all times, for uniformity of weights and measures, in their several countries; and, most of all, in each special department of art, trade, or commerce. The physicians had already established their modification of the troy weight, as that which was to be the single rule in all compounding and selling of medicines; and against the growing infringement of this rule, carrying thus along with it, as it did, a departure from a universally asserted principle, they for long attempted to bring the force of their influence. In a *Draught for the Reformation of the London Pharmacopœia*, prepared by a Committee of the London Royal College in 1742, and then printed, the complaint is urged, for example, that the pound troy being much less than the avoirdupois, while the troy ounce is the heavier, the druggists and grocers, nevertheless, "sell by the avoirdupois weight, and the apothecaries do not generally use the troy weight for pounds and ounces; whereby it happens that, when ingredients are some prescribed in pounds and others in ounces, they are not in their practice proportioned according to the intention of the prescription; and when an ingredient is prescribed by any subdivision of the ounce, their small weights being adapted to a greater ounce than the avoirdupois, those ingredients are also used in a wrong proportion." So strong, actually, had been the pro-

clivity to this source of error, that the Pharmacopœia itself had not been able to escape its influence; and it is stated that, "though the troy weights only are described at the beginning, yet many of the compositions are prescribed according to the proportions of the avoirdupois." Having amended, however, this fault on their own parts by replacing everywhere the troy standard, they finally recommended the total abolition of this "confused use of the two weights," and desired to leave the rest to the vigilance of the censors over the shops of the apothecaries. Again, in a plan for a new Pharmacopœia, issued in 1745, the London College reverts to this subject, describing the irregularity which had now crept into the practice of pharmacy as peculiar to ourselves, from the custom in this country of appropriating different species of weights to different commodities; and they state that already then, as the druggists and grocers sell by the avoirdupois weights, so "few apothecaries keep weights adjusted to the troy pound greater than two drams, but for all above use avoirdupois weights;" a practice of which they once more enjoin the discontinuance, as leading to mischievous error.

Men of eminence, also, not only for special acquaintance with the subject of pharmacy, but for general learning and high character, were not slow afterwards in repeating these charges, and in regretting their necessity. Dr. Healde, among the rest, in his translation of the London Pharmacopœia, published first in 1786, while commenting upon the faults induced by the prevailing irregularities, laments, as was natural for him at the period, "that the avoirdupois weights are not banished entirely from the shops of Apothecaries." In 1788, Dr. Duncan, of Edinburgh, while editing the Dispensatory of Dr. Lewis, complains of the prevailing differences of weights as having occasioned great confusion in the practice of pharmacy. In 1822, when publishing the tenth edition of the Edinburgh New Dispensatory, his eminent son, Dr. Duncan, jun., than whom there was then no higher authority in this department of medicine, and no more conscientious writer and observer, renews the challenge of the want of uniformity of weights and measures as attended with many inconveniences, and charges it, besides, with its fitness for engendering numerous and culpable errors. Dr. Christison, with a like title to attention, in his Dispensatory published in 1842, brings a similar accusation against the current system. Nor have the Druggists and Apothecaries themselves failed to stigmatize frequently the practices, into which the force of their position, and a long inheritance of misuse, have finally, and almost inextricably, led and entangled them. I have been assured by individuals, as well as by firms of the greatest experience, that the nearly universal expedient of making up all compounds of the Pharmacopœia by converting the apothecaries' into avoirdupois weight; with the rule of buying all medicines, and selling all quantities of above a quarter of an ounce, by the latter weight, while preparing prescriptions by the former; and the perplexity of having weights coinciding in name yet diverging in value, each proves to them a continual source of confusion and inconvenience, and adds a perpetual excuse or occasion for carelessness in young dispensers. Nor are these regrets and confessions, the instances of which might have been multiplied indefinitely from within the different departments of the profession, unattended with something like the taunts of others beyond its limits. Colonel Pasley, while treating of weights and measures, retails the admission of the "intelligent" apothecaries whom he consulted, that they sometimes get confused between the two kinds of weight which they are obliged to use daily in the course of their business: and a writer in the *Encyclopædia Britannica*, a work in very extensive circulation, directly charges the College of Physicians with having prevented the completion of an equalization of the weights in this country, under the Acts of 1824 and 1835; and of having been the cause of the very needless retention of two, and in some respects three, different standards as applied to medicine, from the use of which, it is added, arises a tendency to create confusion, with the opportunity for fraudulent transactions.

But the early, though the persistent remonstrances of individual Physicians,

and of the London College, could avail nothing against an irregularity which had struck its roots so deeply, because it had been so naturally fostered, and had found so congenial a support in the general usages of commerce. The Acts of Parliament, however, which we have just referred to, suggested a new opportunity, and gave a new direction to the efforts of many, for the rescue of Pharmacy from the embarrassment which thus threw doubt and discredit on its functions. Feeling the impossibility of bringing back the Druggists to the exclusive use of troy weight in their shops and laboratories, the prescribers of medicine, like prudent and thinking men, began to contemplate the advisability of yielding to its compounders, and of adopting the avoirdupois, which they could not wrest out of the others' hands; or, at least, which it seemed impossible to remove without an effort, the harassment and labour of which would be widely disproportionate from the chances of its success. The first, and, in some degree, perhaps, the unconscious step in this direction, was that made by the Royal College of Physicians of London in 1836, when they adopted the imperial measure, expressly based on the avoirdupois standard, as their rule for the dispensing of liquids. When the Royal College of Physicians of Edinburgh next issued an edition of their Pharmacopœia, in 1839, they followed the English College in adopting the imperial standard of measure; and now with the further, and wholly explicit, declaration, that they could not admit the force of the objections which had hitherto prevented the introduction also of the imperial or avoirdupois system of weights into the practice of medicine and pharmacy. Three years afterwards, Dr. Christison, in the valuable work already referred to, advocated the same views, and with his usual solidity of reasoning. The Dublin College of Physicians, therefore, were not without warrant when, along with a change to the imperial measures, they took another and still more decided step in advance; and, reiterating the often urged complaint, not less justly grounded in Ireland than elsewhere, of the frequent errors, and the unceasing inconveniences caused by the existing discrepancies, determined that the avoirdupois pound and ounce, with the addition of a corresponding drachm and scruple, should be henceforward the rule within their jurisdiction. But unfortunately, this change lost much of the merit which attached unquestionably to its motive, through the circumstance that it seemed only to vary the difficulty by eluding a part of it; for, in attaching, as a concession to a long-established infraction a hitherto unrecognized value to the larger denominations of weights, while retaining the troy grain as the real basis of the system, the actual tendency was to give the appearance of a rule to that practice which was still only arbitrary, and thus to lend the sanction of authority to what remained a confused and defective arrangement, resting upon two different, and, in the strict sense, radically and essentially incompatible standards. This is best shown by the fact, that the troy grain can be converted into no aliquot part of the avoirdupois ounce or of the new drachm; and the expressed value of the former (gr. 437.5), or of the latter (gr. 54.68), or of the associated scruple (gr. 18.22), carried with each so much of an air of defective scientific precision, and of an assurance of practical intricacy and inconvenience, that the plan, however partially efficient in result, and wholly excellent in intention, seemed little likely, on this score, to meet with a general acceptance, even had it been successful otherwise in removing the whole of the existing causes of complaint.

Through this rapid sketch of the leading points in the history of the medical metrology of the United Kingdom which was necessary for our object, we arrive easily at the conception of its existing condition. We have learned that the system of troy or apothecaries' weights, originally established for exclusive use in the sale and compounding of medicines, has been, in spite of injunction and remonstrance, gradually infringed upon, until all quantities exceeding a quarter of an ounce are universally sold by avoirdupois weight, and all Galenical preparations are prevalently compounded by means of a commutation

of the former into the latter standard: that all attempts having failed, through natural grounds of exception, in retaining the Druggists within the rule primarily established, there has been a growing inclination on the part of many to incline towards them, and to sanction that avoirdupois system wholly, which they have appropriated to themselves in so large a part: and that, finally, the result of this has been an adoption of the imperial liquid measures, based upon the avoirdupois standard, for general use in medicine; and the partial adoption, limited as yet to one division of the empire, of a plan of weights for solids, intermediate between the two standards, while in the other two divisions the troy weights are still retained, in as far, at least, as prevailing usages permit them. This state must be clearly one of transition, for it increases an intricacy which was formerly sufficiently embarrassing; but it points as manifestly in the direction towards which the whole system tends, in order that it may be brought into complete harmony, not only with itself, in its several parts, but with the entire arrangements of commerce throughout the country. Meanwhile, it leaves us to regret the position of the Druggist, constrained to the use of "diverse" weights, by his being thus still compelled to buy in one weight and sell in another; or by his assuming arbitrarily the right to sell sometimes in one weight and sometimes in another; for it is a false and inadmissible distinction which separates dispensing from selling. We deprecate this the more, that he is unique in this predicament; and that, with a singular impropriety, it is that department of trade which is the closest in its relations to science, which has not only had tolerated in it a laxity of procedure so wholly adverse to scientific rule, and such even as the law does not now admit in the shop of the pettiest huckster, but which, dealing as it does with the highest of human interests, has been thus rendered liable to the more momentous charge of inflicting needless risks of error and danger upon the public. The means of escaping from such a position, and from such imputations, even if undeserved, are well worthy of consideration, and of more serious efforts than the occasion, fortunately, is likely to demand.

What has been stated, will have shown, at all events, that it is not too much to assert that there is a duty incumbent here upon those who, under the Act for regulating the qualifications of medical practitioners, have had entrusted to them the important charge of preparing the new and long desired British Pharmacopœia, and who, as is specified in the Act, are to direct the true weights and measures to be employed for that purpose. Holding such a power in their hands, the eminent men constituting the General Medical Council are not likely to encounter the responsibility it carries with it, in any other than a spirit becoming the onerous relations of their position to science and the public interests. It would be contrary, on the one hand, to an honest sense of dignity on the part of the General Council, were they now, thus freshly and specifically authorized, to be expected to repeat that injunction for the exclusive use of troy weight, which they know has never hitherto been obeyed, and which it would be even more difficult to render compulsory at the present than at any former period. Yet, as responsible to science, they surely cannot continue, on the other hand, to sanction the existing confusion, and thus linger, in a twofold sense, behind the spirit of the times, which not only demands that there shall be no intermingling of weights in a single craft or profession, but that there shall be ultimately but one uniform and uncomplicated standard, for whatever uses, throughout the country. The public morality would not be respected, if a system were continued which had been charged by grave and experienced authorities with facilitating and procuring the introduction of many errors or malpractices; and those high interests of human health and life, which constitute the peculiar province of the medical profession, would be held as inconsiderately tampered with, if it could be shown, or even plausibly alleged or suspected, that these malpractices had led anywhere to serious risks of uncertainty or injury in medical practice, and yet that the conditions which fostered such dangers con-

tinued to be heedlessly tolerated. It would be no answer to this, that an assurance is offered by the heads of some of the principal firms of Druggists, that the present arrangements, with the calculations and transpositions they render requisite, are safe in their hands. What care, and ability, and experience may render easy to some, may be singularly the opposite where these are wanting; and the man who walks unshrinkingly along the edge of a parapet, must not wonder if others prefer the safer footpath below. It is such a footpath, plain and obvious, and easy for all, or at least rendered needlessly difficult for none, which the framers of the Pharmacopœia are bound to take the present opportunity to provide; and physicians will naturally be excused, if, while cheerfully admitting the merits of at least the more accomplished masters of the craft of the apothecary, they are not the less reminded of human fallibility, and sometimes of human rashness and presumption, even if they do not seek it in the description of apprentice whose existence has been admitted by so eminent a Pharmacopolist as the late Mr. Jacob Bell (*Pharm. Journ.*, 1859, p. 592), who could be heard boasting that he had only been in the business three months, and could *guess* calomel already. But beyond this, there will exist always a class of minds to whom such calculations never can become easy; while, simple as they may be to others, they still must remain challengeable, as involving a chance of error, without offering a particle of advantage in compensation.

Granting then, as at least our own, and not unsupported conviction, that a change is necessary, and that a proper time has arrived for effecting it, to neglect which, indeed, would be to aggravate all difficulties, it only remains to determine what should be its precise nature. Many and various suggestions have been offered for consideration. The first in importance of these has been to proceed at once to some modification of a decimal system; but this by no means with any unanimity of concurrence as to which special plan was the best recommended for selection. The metrical system of the French had its warm advocates; but others, like Herschel and his distinguished associates in the Commission of 1841, desired the decimal division to be based upon the avoirdupois pound, as a scheme the least antagonistic to English usages. Most scientific men would be eager to see a decimal system established in this country; though it could scarcely be expected, generally, that the Druggists, on their part, would be equally eager for a system the merit of which was that it might be rendered uniform throughout Europe, unless they first evinced their earnestness, by showing some anxiety to possess one which should be uniform within their own laboratories. Many, besides, might reasonably be inclined to doubt whether the gramme, with its multiples and submultiples, were really the form best adapted for employment in medicine. But there was, above all, one grave objection to the instant introduction of a decimal system of weights, of whatever description, into Pharmacy, that, while it would widen, in the mean time, the discrepancy between the standard of the apothecary and the ordinary commercial standard, and so aggravate an inconvenience already felt too extensively, there could be no security that, should a decimal system be subsequently adopted by the nation at large, it would prove identical with that which we had independently contrived or selected; and we should thus be compelled ultimately to another change, having derived little intermediate advantage from that which we had undergone the labour to introduce so prematurely. It was necessary, then, to devise such a change as, while it would the least outrage existing usages, would yet satisfy the claims of science and of public justice, by bringing into harmony with each other the weights and measures in current use in medicine, and equalizing, at the same time, both with the commercial standards of the country; and this, it was found, could fortunately be accomplished by an alteration in the value of the grain, converting it into an integral part of the avoirdupois system.

Leaving the General Council, or those whom it has authorized, to declare, at their own time, their determination on this matter, it may be permitted to me,

as being myself in the position of believing the change now indicated to be the best under the circumstances, to explain more fully, yet briefly, its nature and its concomitants; considering what would be its results if actually adopted, whether it would be followed by any inconveniences, what would be the weight of these, and in how far they were to be obviated or admitted of compensation. Commencing then, by again recalling that the present weights or measures for liquids in the Pharmacopœia are based upon the avoirdupois standard, it must be conceded that there is now actually and fundamentally, at least in the London and Edinburgh Pharmacopœias, a mingling of two different standards, the troy (apothecaries') and avoirdupois (imperial), in every formula where liquids and solids are combined. There has thus here crept in something like a renewal of that error, of which the Committee of the London College complained during that attempt, in 1742, at a reformation of the Pharmacopœia, to which we have already made reference. But the anomaly thus introduced is one rather offensive to merely scientific precision than attended by any really practical disadvantages; or, at the most, these can be felt only as complicating the calculations required to determine the proportions between the solids and fluids in any given compound, the quantities constituting which have become conjoined in what has ceased to be a simple and easily ascertainable relation. But it is otherwise with those discrepancies so largely introduced by the Druggists into practical Pharmacy, as well as into the customary sale of medicines, and the amount of reprehension directed against which we have already illustrated. It was in so far a well-directed attempt, therefore, which has been alluded to as having been made by the Dublin College in 1850, when it sought to remove these discrepancies by a change to the avoirdupois system, to the extent that it adopted that system for all denominations of weight above the grain. But this retention of the troy grain, as has been already remarked, still deprived the plan of its due practical and scientific value; for, instead of securing uniformity, it actually sanctioned a new form of intermingling of standards, where there was yet no possibility of a true amalgamation. The existence, as we have seen, of fractional parts in the ounce, drachm, and scruple, evinced the incapacity of the troy grain for becoming a proper basis for the avoirdupois weight, or for being easily assimilated with that weight, because it could not take its place as an integral part of any of its subdivisions. The objection thence arising had its strong support in the practical inconvenience attendant upon the compulsory introduction of such fractional numbers into matters which, in ordinary life, must often become the subject of rapid calculation; while, in a rigidly scientific point of view, its force was insuperable. But the difficulty is at once removed by reducing the troy grain to 0.91145 of its present value, or by taking from it a little more than an eleventh, and assuming this as the medicinal grain: an apparently slight change in itself, yet fortunately with virtue enough in it to remove the whole of the existing confusion, and impart to the arrangements everywhere the dignity and consistency of a uniform system.

By this system, as so completed, the avoirdupois pound is solely retained, with its ordinary division into sixteen ounces; but the ounce will be divided into eight drachms, each, therefore, containing two of the former avoirdupois drachms, a denomination of weight so little in use that it may be said to have become obsolete. However, should it still be thought necessary to recognize its existence, it may be maintained distinct from the new medicinal drachm, by appending to the latter the name of didrachm, as signifying the double drachm; a title for which there would be good classical authority, in as far, at least, as an etymology was concerned. The drachm, or didrachm, again, will be subdivided as usual into three scruples, each of the latter containing twenty grains, and thus the pound 7680 grains, of the new value. The effect of this will be, that the different subdivisions of the pound would be aliquot parts of each other, while each would be an entire multiple of the grain; which, on the other hand, its value once determined, would be as simple an entity as before. But the grain

for solids would now be also equal to the computational weight of the grain, or its representative the minim, in the liquid measure, from which it formerly differed; and this correspondence between weight and measure would be carried upwards through all the multiples of either, the ponderable value of any measured quantity of a fluid, in relation to distilled water, being easily ascertainable by multiplying the ounce by the specific gravity. To the advantages of this fundamental assimilation of the medicinal weights and measures with each other, must now be added that accompanying equalization of both with the ordinary commercial system, which must be considered as having been the main motive for the introduction of any change. Henceforward, the Druggist would sell and compound by the same weight, or by aliquot parts of the same weight, as that by which he made his purchases; and the troy weight being removed, there would be no longer the risk of that confusion, or the necessity for that calculation, which intervened, as a needless source of possible or of actual error, within the whole tenor of his most ordinary transactions, and which frequently rendered him liable besides, as we have seen, to grave suspicions or to graver charges. That the plan accomplishes this equalization, and so fulfils all its objects, was admitted at a meeting of the Pharmaceutical Society, recorded in this Journal (p. 597), to which its details were submitted; and at which I attended, though somewhat less in the capacity of a volunteer than the report assigns to me, having been requested to make the explanation by a very important body, who had arranged to await the result. The following tabular view represents the proposed adjustment:—

Pounds.		Ounces.		Drachms.		Scruples.		Grains.
℔j.	=	16	=	128	=	384	=	7680
℥j.	=			8	=	24	=	480
				ʒj.	=	3	=	60
						℈j.	=	20

(1 gr. troy = 1.09715 avoird.—1 gr. avoird. = 0.91145 troy.)

If the admitted advantages of the proposed arrangement be such as we have represented them, the inconveniences attendant upon it should be of a very decided character to justify any doubt as to its reception. But if we turn to the report of the proceedings of the Pharmaceutical Society already referred to, we find that, on the part of the Druggists at least, they seem really to limit themselves to two. The one was the irksomeness of any change; yet, as many of the Members advocated the introduction of a metrical system, such as we have seen would be wholly inexpedient for the present, but which would require for its adoption an infinitely more thorough subversion of all existing usages than the sole alteration of the grain, it may be considered that the one notion is a sufficient neutralization of the other, even could the circumstances be admitted fairly as allowing the consideration of either. The other inconvenience, and that which was alone really insisted upon, was, that so long as any prescriptions written before the introduction of the new system continued to be presented, and which, therefore, were to be compounded upon the old system of weights, there would be continual risk of error in dispensing them. This was, indeed, to narrow to its extremest limit what was to be received as an opposition to a wide and comprehensive general measure; but as the objection is certainly a tangible one, it is just that it should be answered. Had the former system been itself charged with no promotion of error in all its parts, and through all its duration, this anticipation of evil with reference to the new, when thus confined to a single category, and one which, as it must be the least extensive of all now, will infallibly become every day smaller, would have been entitled to greater prominence. But when we consider how transitory its influence, and how trifling the amount of its capacity for mischief, compared with that which the proposed new arrangement removes, we can assign to it only a very insignificant value. But, still more, we must consider whether the change of the weights be the sole, or even the most important, obstacle to be encountered with reference

to this class of prescriptions. Unquestionably, the variations in the strength of the different Galenical preparations, such as it will be impossible to avoid in reducing the several existing Pharmacopœias to one harmonious whole, and in accommodating that whole to the progress of medical science, and possibly to the newly perceived exigencies of medical practice, will interfere far more imperiously with the currency of antiquated prescriptions than any reduction of a fractional part of their strength, such as the change in the value of the grain will be fitted to effect; and dispensers will doubtless soon discover, that the demand made upon their caution, in this way, by the introduction of the new weights, will be the least exigent of what will be still the reasonable duties imposed upon them. Besides, there can be no hazard, where the difference in dose is a diminution and not an increase; while, should there be anywhere a hankering after an extreme nicety of adjustment, the addition of a tenth, in adapting the new weights to the old prescriptions, will involve a far less intricate and more easily familiarized calculation than Druggists have hitherto been in the habit of encountering voluntarily under the existing system. But the honest and experienced physician will remove all pretext for anxiety by pointing out to them, that there really exists, and can exist, no such level uniformity in age, sex, habits, and physiological or pathological condition, that the practitioner can adjust his ordinary remedies to it to the nicety of the eleventh part of a grain, or, in the case of powerful medicines, such as strychnine for example, to less than the 120th part of that quantity, which would be about the proportions in either instance in which the strength of the dose would be altered.

Finally, as all new formulæ would be adjusted to the new weights, and all new prescriptions to the new formulæ, and as not the oldest practitioner would require to write his prescriptions otherwise than in the mode and with the characters to which long habit had given the force of a predilection; while the old troy weights might almost instantly be totally and perpetually banished from the laboratory, and that with the entire safety we have described; and no new denominations of weights, save those below the value of a quarter of an ounce, such as would be procurable at the cost of a few shillings, would be required to complete what would now be the sole and uniform standard; it seems surprising how it should be possible that so much should be accomplished at so insignificant a sacrifice. And if, at what will still, in all probability, be a remote period, we should ever be required to advance to a general metrical system, we shall assuredly accomplish this the more easily and naturally, that we shall proceed simultaneously with the universal interests of the country from the avoirdupois to the novel standard, the relations of which will be the more readily mastered by all, that from a common basis we pursue a common object.

To those who have a natural repugnance to an innovation, it may be some additional satisfaction to reflect, that possibly already in the reign of Henry III., but certainly in that of Edward I., the statute pound of England was divided, like that now suggested, into 7680 grains; while we learn from the *Lexicon Technicum* of Harris that, down to at least 1704, drachms and scruples, in precisely the same relative proportions (eight and three) as those in the apothecaries' weight, were the recognized submultiples of the avoirdupois pound of sixteen ounces. The classical scholar will have a similar gratification in remembering, that the avoirdupois ounce, as now proposed for medicine, is considered to be as nearly identical as possible with the Roman *uncia;* and that the new, or, in this sense, the revived grain and scruple would thus, along with the drachm, assume the same close relation to those inherited from antiquity and employed by Galen. But there is still greater room for congratulation in the circumstance, that the contemplated reduction in the value of our grain would bring it nearer to that of all other systems of medicinal weights at present employed in Europe, and similarly inherited; with the sole exception of that of Austria, or of a recently contemplated, but still not established, innovation in

Prussia; but including that formerly in use in France, and still occupying its place in the medical literature of that country, as in that of the bulk of civilization everywhere else, and throughout all periods.

With these observations, in which I have already transgressed my limits, without, however, having approached the exhaustion of my subject, I leave the question to the review of the intelligent Druggists of Great Britain; with a confidence towards them, which has not disappointed me elsewhere, that a little calm consideration will speedily dispel the feeling of reluctance which naturally arises on a first suggestion of innovation, and that the proposal will ultimately receive from them the justice which, on so many grounds, I believe it to be entitled to at their hands.

NEW WEIGHTS AND MEASURES IN GERMANY.

Great Britain is not the only country which is occupied with the perplexing task of revising, and, to some extent, remodelling the weights and measures.

The following letter by a Pharmaceutist in Philadelphia contains some concise practical remarks on a change in the weights and measures recently introduced in Germany, which has involved the question in very great complication and confusion:—

TO THE EDITOR OF THE AMERICAN JOURNAL OF PHARMACY.

Dear Sir,—The *Archiv der Pharmacie*, May, 1858, p. 257, &c., contains tables for the reduction of the former medicinal weight to the weight which is hereafter to be the lawful standard in Prussia, and *vice versâ*. The following extracts will convey an idea of the new system, and also show its relation to the old, now discarded, one:—

		1 grain	=	Loth.		Quint.		Cent.	3.65399	Korn.
		5 "	=	"		"	1	"	8.26996	"
		10 "	=	"		"	3	"	6.53992	"
		1 scruple	=	"		"	7	"	3.07985	"
		1 drachm	=	"	2	"	1	"	9.23954	"
		1 ounce	=	1 "	7	"	5	"	3.91630	"
1 medicinal lb.	=	12 "	=	21 "		"	4	"	6.99557	"
1 civil lb.	=	16 "	=	28 "		"	6	"	2.66076	"
		1 Korn.	=	.273 grains.						
		5 "	=	1.367 "						
10 Korn.	=	1 Cent.	=	2.737 "						
10 Cent.	=	1 Quintchen	=	27.374 "						
10 Quint.	=	1 Loth.	=	4	drachms, 1 scruple, 13.740 grains.					
30 Loth.	=	1 lb.	=	17	ounces, 52.20 grains.					

This new system of weights appears to have been legalized by the various German States comprising the "Zollverein," wherefrom it has received the name "Zollgewicht." I do not know how its unit was obtained, but from its term Korn (English rye, grain or seed) it is to be inferred that the medium weight of some seed, probably rye, has been selected for it.

Dr. L. F. Bley, the Editor of the *Archiv*, makes the following remarks:—"The introduction of these new weights for use in medicine will be a source of annoyance until the physicians have become thoroughly acquainted with them. All difficulties might have been obviated if the French gramme weight had been chosen, which has long been adopted in science."

In the above tables it must be remembered that the old Prussian grain is equal to .96 grs. troy, and the old Prussian medicinal pound = 5415.1 grs. troy, and by calculation the weight of the new Prussian, or rather "Zoll pound," is found to be 7720.47 grs. troy.

It is to be regretted that by this act still more confusion is gained, and from the arbitrary unit and the arbitrary division we may infer that it will have to give way to a more rational system. The labours of our American Committees on weights and measures, we will hope, will produce something nearer to perfection.

Yours, very respectfully,

Philadelphia, Oct. 20th, 1858. John M. Maisch.

INTRODUCTION OF THE *CINCHONA* INTO INDIA.

We have great satisfaction in stating that steps have been taken for the realization of this important project, for we understand that Mr. Clement Markham has been appointed by the Government to proceed to the Cinchona districts of South America for the purpose of obtaining seeds and plants of some of the more valuable species of Cinchona, and of transporting them to India, where there is good reason to hope their acclimatization will be as successful as it has already been in Java. We are glad to hear that Mr. Markham is well acquainted with the Cinchona districts, and has a thorough knowledge of the Spanish language. Such qualifications, when accompanied by good botanical acquirements, can scarcely fail to achieve success in so important an undertaking, and we sincerely trust that all who are in a position to assist Mr. Markham will do so cheerfully, and then we have little doubt the experiment will be entirely successful.

We take this opportunity of correcting an error which many Pharmaceutical Chemists and others have fallen into, with reference to the supposed discovery of a species of Cinchona in Africa by Dr. Livingstone. The plant thus thought to be a Cinchona is a species of *Malouetia*. Nat. Ord. *Apocynaceæ*. This plant, like several others of the order to which it belongs, possesses febrifugal properties, but it contains no quinine or other alkaloid resembling it, as supposed by Livingstone.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

A Compound of Iodide and Nitrate of Silver.—Dr. Hofmann has described, at a meeting of the Chemical Society, a compound of iodide and nitrate of silver, which was obtained by treating a mixture of iodide and oxide of silver with nitric acid. He found that the iodide fused in the boiling liquid, forming an oily-looking strata at the bottom of the vessel, which solidified on cooling into a crystalline mass. This salt, when treated with water, was resolved into nitrate and iodide of silver. Upon further examination of this compound, he found that its composition varies according to the relative quantities of its constituents originally present, and the amount of nitric acid employed. From the result of several experiments, he found the limits of combination in the fusible compound to be as follows :—

	I.		II.
Nitrate of Silver	69.52	.....	33.67
Iodide of ditto	29.84	.....	65.55

The first of these results corresponds to the formula $3(AgO, NO_5), AgI$, while the second may be represented as $2(AgO, NO_5), 3(AgI)$.

By continued ebullition, the proportion of iodide of silver may be still further increased, but the compound then no longer fuses in boiling concentrated nitric acid.

A combination of iodide and nitrate has been also observed and suspected by other chemists, although no analysis or examination appears to have been made excepting by Dr. Hofmann. Mr. F. Maxwell Lyte, in a recent letter to the *Journal of the Photographic Society*, alludes to such a combination:—

"It is, I believe, allowed by many, though not by all, that there does exist a compound of the iodide with the nitrate of silver; but the various forms and properties of this substance, and the important part it plays in photography, have been little, if at all, separately examined, and I now propose to mention a few facts and considerations with regard to it.

"We have the iodo-nitrate of silver, if we may so call it, under three different forms:—First, in solution, when we dissolve iodide of silver in the negative nitrate bath; secondly, in the amorphous form, as it appears on the surface of the collodion plate; and, thirdly, it may be obtained in the crystalline form by adding recently precipitated iodide of silver to a nearly saturated solution of silver nitrate, when it will be found that much of the iodide, which at first dissolves, reprecipitates as a

crystalline iodo-nitrate, and that even the excess of iodide which remains undissolved slowly becomes converted into a similar crystalline deposit. This crystalline iodo-nitrate is sensitive to light, like the amorphous deposit on the sensitized plate, and it may be dried without losing its crystalline form; but as soon as it is touched by water it decomposes, loses its silver nitrate, and by sufficiently prolonged washing becomes reconverted into silver iodide, as insensible to light as it was before being placed in contact with the silver nitrate. The amorphous deposit on the plate is subject to exactly the same laws, only it is rather more sensitive than the crystalline iodo-nitrate, a difference probably attributable to the crystalline form of the latter; but by washing it loses, like it, its combined nitrate, and becomes equally insensible to light, while at the same time it passes from a straw-yellow to pale primrose.

"Now, what results from the consideration of the above facts?* Simply, that by their means we are enabled to explain several of the rules which practice has from time to time given to photography. As the iodide of silver, when placed in a concentrated solution of silver nitrate, first dissolves and then reprecipitates as crystalline iodo-nitrate, we can understand why it is that in practice it is found inconvenient to employ a bath of nitrate of silver over a certain strength, as it infallibly destroys the sensitive film; and for a similar reason we should not allow the nitrate bath to concentrate by evaporation and dry on the plate. Again, we destroy the sensibility of the plate by prolonged washing, since we thus decompose the iodo-nitrate upon its surface, as above described; and, lastly, when we wish to preserve the sensibility of a collodion plate, we wash it with a glutinous or syrupy liquid, which, by enclosing each atom of the iodo-nitrate, protects it from decomposition while we are getting rid of the superfluous nitrate.†

"Is it not also highly probable that the accelerating action of many salts, as acetates, nitrates, fluorides, &c., the use of which has been so much questioned by some, and recommended by others, may be attributable to the formation of iodo-acetate, iodo-fluoride, &c., of silver? Iodide of silver is not the only salt of this metal which possesses the property of retaining the nitrate in combination. The chloride and bromide have the same property, though in a less degree, and probably many others also; and we find the following passage in *Turner's Chemistry*, under the head of 'Tribasic Phosphate of Oxide of Silver:'—'This compound subsides of a characteristic yellow colour, when the rhombic phosphate of soda is mixed in solution with nitrate of oxide of silver. . . . It is apt to retain some of the nitrate in combination.' This doubtless arises from a similar reaction to the one I have described above."

On the Iodides and Bromides of Bismuth, Antimony, and Arsenic.‡—The properties of these compounds have been as yet very little studied, in consequence of the difficulty attending their preparation. When the metal and metalloid are brought into contact alone, combination takes place with such avidity as to give rise to inflammation and detonation ; while, if water be present, the compound formed is decomposed into an oxy salt. M. J. Nickles has succeeded, however, in producing them with great facility by the employment of a liquid, which shall be at the same time a solvent of the metalloid, and of the compound to be obtained. Thus bromide of bismuth is prepared by adding the powdered metal to anhydrous ether, containing its own volume of bromine, and bromide of arsenic or antimony, by reacting with the metal upon a solution of bromine in bisulphide of carbon. If any trace of water should be present, a white deposit of oxy bromide will take place. The bromides of bismuth (Bi, Br_3), of arsenic (As, Br_3), and of antimony (Sb, Br_3), are fusible at a slightly elevated temperature ; they are very deliquescent, liquifying in the air in the order they are named. The two first crystallize in a vacuum in fine prisms, the latter in the form of rhomboidal octahedrons. We are not at present acquainted

* "It is also curious to observe the change of colour which takes place when iodide of silver which has been precipitated in presence of an excess of iodide of potassium is added, after being well washed, to a solution of silver nitrate, when its colour will be seen to change at once from pale primrose to a deeper and more brilliant yellow."

† "It was the knowledge of the fact of the existence of this iodo-nitrate of silver—which is decomposable by water, but not so by washing with a weaker nitrate bath—which induced me, when I first published my 'Honey Process,' to recommend the addition of nitrate of silver to the syrup. This addition has since been proved by Mr. Shadbolt to be, with certain precautions, unnecessary, as the glutinous nature of the honey itself, coupled with the porosity of the collodion film in which the iodo-nitrate is formed, suffices to protect that compound from decomposition."

‡ *Comptes Rendus.*

with any double salts formed with these iodides and bromides, probably because they are decomposed in contact with water ; but when a syrupy solution of bromide of bismuth in this liquid is heated for an instant with bromide of ammonium, fine yellow plates of the double salt are deposited on cooling.

The iodides of arsenic and of antimony are both soluble in sulphide of carbon, and crystallizable from the solution, they are unchanged in the air, and are isomorphous, crystallizing in fine red plates belonging to the rhombohedric system.

On the Action of Hydrogen at different Pressures on Metallic Solutions.—M. N. Bćkétoff has shown that hydrogen, when under an increased pressure, is capable of precipitating silver and mercury from their saline solutions, and consequently of assuming a place in the series of metallic substitutions.

The experiments were conducted as follows:—In the different branches of a glass tube, bent into several curves, were introduced the saline solution, an acid and metallic zinc, the ends were then sealed, and the acid allowed to run on to the zinc. The hydrogen thus generated then came into contact with the metallic solution under increased pressure.

Chloride of silver dissolved in ammonia, and submitted to this action, became browned at the surface, and, at the end of several days, it had deposited on the sides and bottom of the tube a grey powder, which, upon examination, presented all the characters of metallic silver. The author did not find hydrogen exert any reducing action upon the same solution at the ordinary pressure. Nitrate of silver, treated in a similar manner, soon deposited metallic silver as a white crystalline pellicle. The liquid, which was neutral, had become acid. A *saturated* solution of sulphate of silver, submitted to the action of compressed hydrogen, presented no sign of reduction at the end of several days, but the same solution diluted with three times its weight of water, commenced to decompose after a few hours' contact. In some cases the silver was deposited as a metallic mirror on the sides of the tube, but in other cases a deep grey powder was precipitated, which, upon being gently heated, lost its peculiar tint, disengaged a gas, and was converted into ordinary metallic silver. This substance was not obtained in sufficient quantity to admit of a proper examination, but it appeared probable that it might consist of a hydride of silver.

Acetate of silver is decomposed by hydrogen at the ordinary pressure of the atmosphere. Solution of nitrate of mercury also deposited small globules of mercury when acted upon in the above manner.

On the Odorous Principle of Vanilla.*—M. Gobley has recently published the results of an investigation which he undertook for the purpose of ascertaining the nature and properties of the odorous principle of vanilla. Bucholz and Vogel appear to be the only chemists who have made any chemical examination of this fruit. Bucholz obtained from it a fatty oil having a rancid and disagreeable odour, a soft yielding resin, which had a very faint odour of vanilla when heated, a slightly bitter extract, an extractive matter resembling tannin, sugar, an amyloid body, and benzoic acid. Nothing appears to have been obtained, however, which would account for its peculiar odour.

M. Gobley proceeded in the following manner:—The vanilla was treated with rectified spirit, and an extract obtained which was mixed with sufficient water to give it a syrupy consistence, and then agitated with ether. The ethereal solution upon evaporation left a brown substance having a most powerful odour. This residue was treated with boiling water, which dissolved the aromatic principle, and the filtered liquid was evaporated and allowed to crystallize. The crystals, which were at first much coloured, were then purified by animal charcoal, and successive crystallization. The substance thus obtained, when pure, forms long colourless needles or four-sided prisms. It possesses a most powerful aromatic odour, strongly resembling the vanilla ; its taste is warm and penetrating. The crystals are hard, and crack under the teeth. It exerts no sensible action on litmus. At 168° F. it fuses, and at 302° F. it volatilizes, and forms small needle-like crystals of a brilliant whiteness, which possess all the fragrant odour of vanilla. It is difficultly soluble in cold water ; boiling water dissolves a very large quantity, which is again deposited on cooling. It is very soluble in alcohol, ether, and the fixed and volatile oils. Oil of vitriol dissolves it, forming a yellow colour. It is soluble in the dilute acids without change.

It is readily dissolved by solution of potash, from which it is precipitated by acids

* *Journal de Pharmacie.*

without alteration. It does not liberate carbonic acid from the carbonates, even by the aid of heat. The following is the result of its analysis:—

Carbon	75.22
Hydrogen.....	3.98
Oxygen.....	20.80
	100.00

Which gives the formula $C_{20}\ H_6\ O_4$. The properties of this crystalline substance approach those of coumarine, which the author several years ago found to exist also in the leaves of the Faham,* differing, however, in its odour, its fusing point, and its chemical composition. This body appears therefore to constitute an immediate and peculiar principle, to which M. Gobley applies the name *vanilline*.

It is well known that the surface of vanilla is generally covered with small needle-like crystals, termed by the French *givre*. Bucholz considered these crystals to be benzoic acid, and this opinion was afterwards adopted by Vogel, senior. M. Gobley, however, considers these crystals to consist of this new substance vanilline. He finds them, in fact, to correspond in all their properties, to possess the same crystalline form, the same fusing point, the same solubility in water, in alcohol, and ether. When, however, this crystalline matter is dissolved in alcohol, and tested with litmus paper, it communicates a faint rose tint ; and it is this property which probably induced the former chemists to regard the body as an acid. M. Soubeiran, however, disregarding this character, states that the crystals covering vanilla are not an acid.

In consequence of these facts, M. Gobley made a comparative examination with reference to their action on litmus paper, of the crystals of vanilla, and the coumarines extracted respectively from the Tonka bean (*Dipteryx odorata*), the asperula, the melilotus, and the leaves of the faham (*Angræcum fragrans*), and he found that while the coumarine obtained from the first source gave a faint rose tint, that from the remaining three, and which have never been regarded as acids, reddened the paper more sensibly than the crystals from vanilla. The author, therefore, concludes that the crystals from vanilla are identical with, and consist of, the body which he has termed vanilline, and which must be regarded as an immediate neutral principle, analogous to coumarine.

On a New Alkaloid and Organic Acid from the Corn Chamomile.—M. C. Paltone, pharmacien to the Civil Hospital of Alexandria, has recently shown that the *Anthemis arvensis*, a common plant growing in the corn-fields, is capable of yielding a crystalline alkaloid, which he terms *anthemine*, and also an organic acid, *anthemic acid*. The process which he adopted is as follows :—The flowers of the plant are distilled with water, and the distillate set aside, the residue in the retort is strained, and the liquor allowed to stand for 24 hours, then decanted, filtered, and evaporated by means of a water-bath, to the consistence of an extract ; this is treated with boiling spirit of 36 per cent., which dissolves a resinous matter and the new acid, until the liquid no longer reddens litmus paper. The spirituous solution is then set aside for further treatment, and the insoluble matter is boiled with distilled water, filtered, and allowed to cool. Ammonia is then dropped in until the liquid becomes distinctly alkaline, when, in the course of a few minutes, brilliant prismatic crystals begin to deposit ; these are afterwards collected and washed with a little cold water. The substance thus obtained is without odour and taste. It is sensibly alkaline, very slightly soluble in cold water, but more so in boiling water. It is insoluble in alcohol and ether, and readily dissolved by acetic acid. It is carbonized by heat and by oil of vitriol.

To obtain the acid the spirituous solution, which resulted from the above process, is evaporated to an extractive consistence, and the residue dissolved in the distillate obtained in the first part of the process. The clear liquid is saturated with baryta water, boiled and filtered. Dilute sulphuric acid is then dropped in to precipitate the baryta, but without leaving the least trace of sulphuric acid in the liquid. The solution is filtered, and evaporated to dryness by the water-bath, and the residue treated with ether. From this solution the acid is deposited in prismatic crystals on evaporation. These crystals have a decided bitter taste, and the peculiar odour of

* The *Angræcum fragrans*, an epiphytic plant, the leaves of which are exported from the Mauritius, and possess a very fragrant odour strongly resembling vanilla.

camomile. They strongly redden litmus paper, are soluble in alcohol, ether, and water, but insoluble in benzol.

The author is still engaged in the examination of these substances, and in ascertaining whether they also exist in the *Anthemis nobilis*.

M. Niepce de St. Victor's Experiments on Light.—M. Gaultier de Claubry, in a communication made to the French Academy on the 7th March, describes the results of some experiments confirmatory of those of Mr. Crooke's, which were described in our last number. He states that when paper sensitized with various agents, was placed beneath a sheet of paper with letters marked on its surface, and heated from 100° to 120° cent., for periods varying from ten minutes to an hour, he obtained a complete reproduction for the black letters, and less sensible for the red, results analogous to those of M. Niepce, and ascribed by him to the action of light which had been absorbed.

Solubility of several Alkaloids in Chloroform.—M. Pettenkofer states that at the ordinary temperature, 100 parts of chloroform dissolve, of morphine 0.57, narcotine, 31.17, cinchonine, 4.31, quinine, 57.47, strychnine, 20.16, brucine, 56.79, atropine, 51.49, veratrine, 59.49.

On a New Source of Ammonia.—Mr. Alexander Williams, of Neath, in a letter to the *Journal of the Society of Arts*, has suggested a means of economizing the waste nitrogen products escaping from the oil of vitriol chamber, by effecting their conversion into ammonia. This is done by passing the escaping gases, mixed with steam, over heated charcoal, and then into dilute sulphuric acid, by which sulphate of ammonia is obtained.

The following is Mr. Williams's description of the arrangement he employs, and which has been tried on a large scale at the Pontardawe Vitriol Works.

The apparatus fitted up was of the following description:—A furnace was built above the exit tube of one of their vitriol chambers, and a brick gas retort, about 14 inches in diameter, 8 feet long, and open at both ends, was passed through its whole length. This retort was filled with charcoal, and kept at a red heat ; the exit tube of the chamber, and a steam-jet to supply the hydrogen, were attached to one end, whilst to the other end was fixed an upright leaden cylinder, filled with coke, and moistened with diluted sulphuric acid. On passing the waste gases and steam through the retort containing red-hot charcoal, both were decomposed, the oxygen of each uniting with the charcoal to form carbonic acid ; the nitrogen and hydrogen combining to form ammonia; then together, probably forming carbonate of ammonia, which was again decomposed by the diluted sulphuric acid, the sulphate of ammonia being found remaining in solution. This solution was then evaporated, and in July, 1857, I first had the pleasure of obtaining any quantity of crystals of sulphate of ammonia, by this process, from a vitriol chamber in actual work.

Mr. Williams does not intend to make this process the subject of a patent.

THE DIFFERENTIAL STETHOPHONE, OR DOUBLE STETHOSCOPE.

BY SOMERVILLE SCOTT ALISON, M.D.

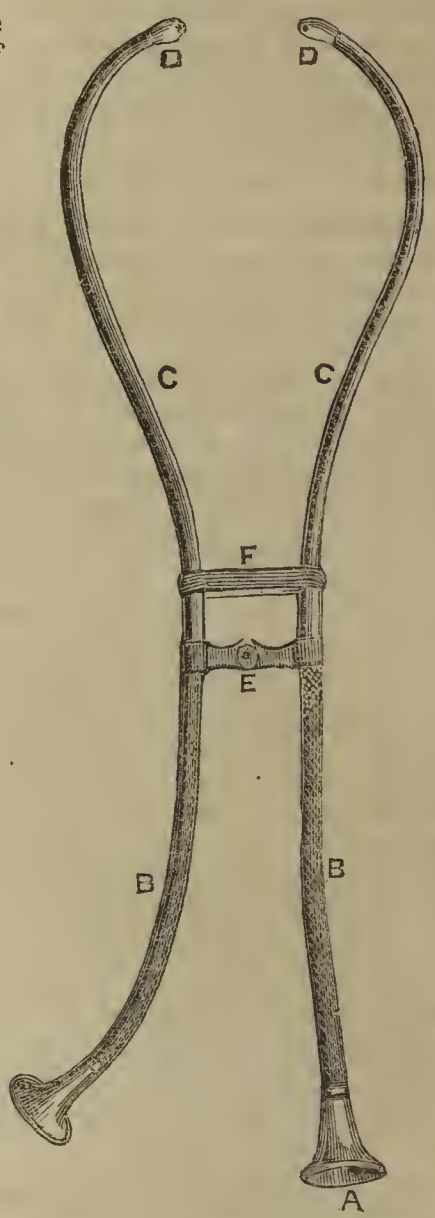
(*Substance of a Lecture delivered at the Royal Institution.*)

CERTAIN auditory phenomena, bearing upon the correlation of the ears, and possessing some interest, have been recently made out by the employment of a double stethoscope, which has been called the differential stethophone, contrived by Dr. Scott Alison.* This instrument, like the first double stethoscope, viz. that of Dr. Leared, is applied to both ears, and has the self-adjustment of that of Dr. Camman of New York. It consists of two tubes for the two ears respectively, each independent of the other except for purposes of adjustment, manual management, and convenience of application. Each tube consists again of two parts, a tube part and a cup or sound-collecting aperture. The cup, made of mahogany or other freely vibrating wood, is about one inch in diameter at its mouth, and about one-eighth of an inch in diameter at its proximal extremity. The tube near the cup is made of flexible wire, and is covered with silk ; the part nearer the ear is made of metal, and at the aural extremity is furnished with an ear-knob of ivory for insertion

* It is to be observed, that for the differential stethophone to have its properties made available, it is necessary that both ears of the observer should be alike in acuteness.

into the cavity of the external ear. The bore of the knob and of the metal part of the tube is about one-eighth of an inch in diameter.

An instrument possessing the same acoustic value may be made at much less expense than that above described. A piece of india-rubber tube, about 18 inches long, having a bore of one-fifth of an inch in diameter, may have fitted upon one extremity an ear-knob, and upon the other a sound-collecting cup. Two of these, held together by means of a ring of ivory or steel, will make an excellent differential stethophone or phonoscope.



The differential stethophone was designed with the view of collecting different sounds from two parts of the body at the same time, and conveying them separately to each ear. It formed in reality a stethoscope for each ear, and it differed from all binaural or double stethoscopes hitherto employed, which collected sound through one aperture or cup only. Though the old binaural stethoscopes could not be made differential instruments, the differential stethophone might be made a binaural stethoscope, simply by placing the two sound-collecting cups at the same part of the chest. When this is done, the same auditory result is obtained as when the simple binaural stethoscope is employed, viz. a full sound and a distinct auditory sensation, fuller than when one ear only is employed. The advantages sought by means of the differential stethophone were, first, to give facility in comparing the intensity of the fine breath sound of the lung at two different parts of the chest at the same time; and second, to ascertain with exactitude the relative commencement and termination of two sounds generated at different parts of the thorax; which hitherto was impracticable: for, as is obvious enough, it is not possible to have one ear at the same moment at two different parts, or to have the two ears in the same plane, which, however, is now virtually effected by the differential stethophone. The second object was fully obtained; but the first was not secured when the two ears were simultaneously employed, though by using the two ears in succession this great advantage of comparing the intensity of one part with the intensity of another was fully gained. It was found that the weak or defective respiratory sound of one part produced no sensation in the ear to which it was conveyed when the stronger sound of another part was communicated to the other ear.

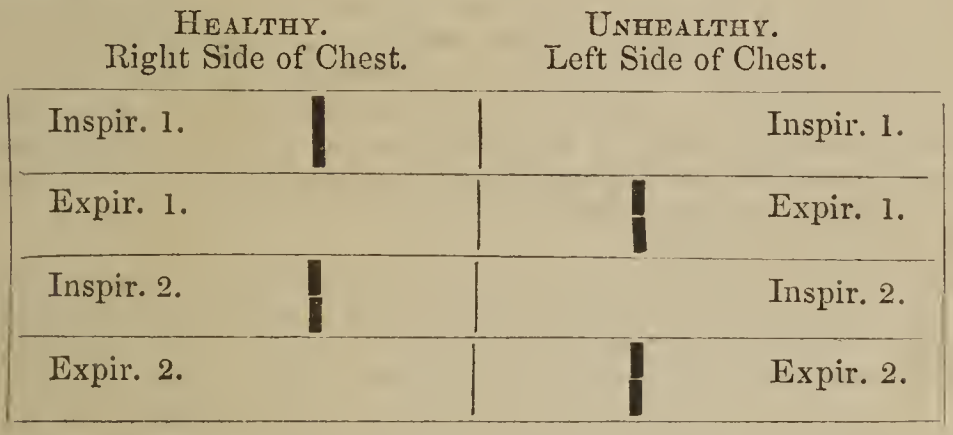
This failure of the differential instrument, though disappointing at the moment, has led to the ascertaining of an important acoustic principle, and to the practical application of it in medicine, viz. that a major impression made on one ear will prevent all consciousness or perception of a minor impression made at the same time on the other ear, by the same sound; and that an impression on one ear which produces a distinct sensation may be made to produce no sensation whatever, by conveying at the same time a major impression of the same sound to the other ear: the sensation obtained through the latter ear totally destroying or obliterating all sensation of the same sound in the other ear. By the same sound is meant the sound proceeding from the same body, as a watch, a bell, or from two bodies of the same kind, as two tuning-forks of the same size and note.

Major impressions on one ear prevent sensations of minor impressions on the other ear only in the case of the same sound, and not in the case of sounds of a different character, unless indeed the major sound happens to be very intense and deafening. Therefore the loud sound of one watch and the weak sound of another watch may be distinctly heard in the two ears, one in one ear only and the other in the other ear only, provided that one ear be favoured with a major impression of one watch, and the other ear be favoured with a major impression of the sound of the

other watch. In this ease, the stronger impression of either watch nullifies in a sensorial sense the weaker impression; and as the strong impression of one watch is made in one ear, and the strong impression of the other watch is made upon the other ear, one watch is heard in one ear and the other watch is heard in the other.

The principle of restriction of hearing of the same sound to that ear on which a major impression is made is illustrated in respiration. The ear connected with a part where the respiration is weak, fails, as has been already stated, to convey any sensation, while the ear connected with a part where the respiration is strong produces sensation.

The diagram represents the sounds occurring alternately in two sides of the chest in a *consumptive* patient. The dark spots represent the *sounds*. The right side has the Inspiration strong, the Expiration faint. The left side has the Inspiration weak, the Expiration coarse.



The same principle may be made to perform an important part in the diagnosis of diseases of the heart, accompanied by murmur. If the two cups of the stethophone be applied at two points of the area of a murmur differing in intensity, the sound is heard by that ear only connected with the point where the murmur is more intense. Now as the source of a murmur is determined by the point of its greatest intensity, it must be obvious that a ready mode of diagnosis is offered. If there be a material difference at the two spots examined, sound is heard only by that ear connected with the more intense point. The test is absolute; for in one ear there is no hearing, and in the other there is hearing. There is consequently no room for error in judgment as to degree, as in the case of consecutive observations with one ear only, with the ordinary stethoscope.

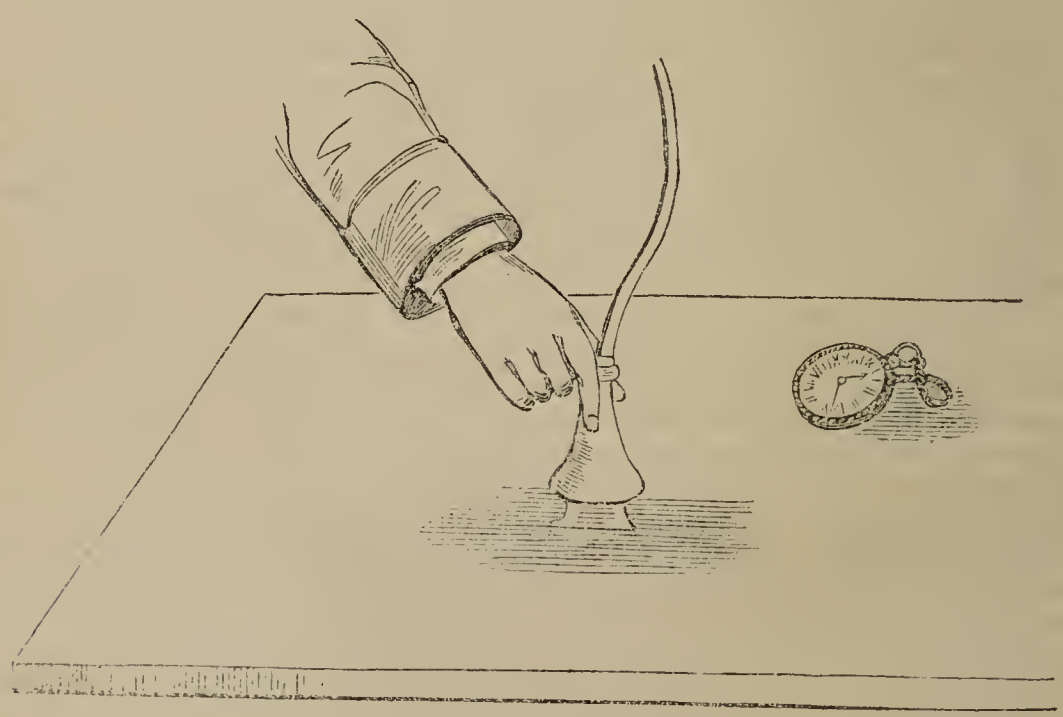
The human ear being capable of hearing many sounds at the same moment (if one be not extremely intense), and as the principle, so to speak, of restriction of hearing to the favoured ear holds in the case of all, it follows that if one can be favoured with a major impression of fifty sounds, they shall all be heard through that ear, and through that ear only. And if some of these fifty sounds be carried in major intensity to one ear and some in major intensity to the other ear, some of these sounds will be exclusively heard through one ear, and some exclusively through the other ear; a division of sounds thus virtually taking place. Indeed, if we possessed fifty ears, and if of fifty sounds one could be carried in a major intensity to each of these fifty ears, each of the fifty sounds would be heard exclusively through one ear—*i.e.* each ear would hear one sound exclusively.

This apparent division of sounds may be effected by placing a watch upon a musical box. If both cups of the stethophone be placed so as to receive sound from these bodies equally well, both sounds will be perceived through both ears, and if one cup be placed nearer these two bodies than the other cup, both sounds will be heard in the ear connected with this cup; but if one cup be held a little nearer the musical box than the other cup, and if this other cup be held a little nearer the watch—*i.e.* if one cup be a little favoured in respect of one sounding body, and the other cup be a little favoured in respect of that of the other sounding body, the musical box will be heard through that ear only which is favoured in respect of it, and the watch will be heard exclusively through that ear that is favoured in respect of that body. When two murmurs occur at the heart, one at the base and another at the apex, possessing, as they usually do, different characters (say one being "blowing" and the other being "rasping"), and they blend together, they may

be thus sensorially separated by placing one cup at the base, and the other at the apex, points of major intensity of the two murmurs respectively.

Of the amount of difference which shall suffice to render one ear as it were sensationless and to effect a monopoly of sensation in the other, it is difficult to speak with great precision. The difference must be considerable, but need not be very great. In the case of a watch, if one cup be placed fully on the watch, and the other one-third or one-half off it, sensation is limited to the ear connected with the first; if the cup wholly on the watch be now moved off the watch, but kept within half an inch of it, sensation is limited to the other ear; and if the cup half or one-third off the watch be now moved wholly off it, to the distance of an inch or more, sensation is again transferred to the other ear. Transitions of sensation may be thus indefinitely carried on from one ear to the other. This corresponds with ordinary audition: for if we draw a circle around the head in the plane of the horizon, which may be called an acoustic circle, we shall find that on carrying a sounding body round it, binaural sensation is procured only so long as the body is within about 10° on either side of a line drawn forwards and backwards at right angles with the transverse line of the head. In the case then of such a circle we have distinct binaural sensation limited to a region of about 20° in front and 20° behind. The intermediate arcs are the regions of uno-aural sensation; it thus appears that in ordinary audition a moderate superiority in respect of intensity of sound gives a monopoly of hearing to one ear.

The intensity of sound in the ear which has served to give it a monopoly of hearing to the disadvantage of the other ear, has in the foregoing observations been chiefly obtained by greater proximity of one cup of the stethophone to the sounding body over the other; but this may be procured by other means. A superior mode of conduction in respect of one ear over the other, or of one cup of the stethophone over the other when the ears and the cups are similarly placed in respect of the sounding body, will give a like intensity. A solid rod in the case of one ear, while the atmosphere is the only medium of communication in the case of the other, in respect of a sound of a solid body, will suffice to give the monopolizing intensity. In the same way it has been recently ascertained by Dr. Scott Alison, that water placed at the distal extremity of a hearing tube will give an advantage of intensification or of more perfect conduction sufficient to restrict hearing to that ear favoured



with its aid, and to render sensationless the ear connected with the sounding body by means of a hearing tube having *no* water at its extremity to intensify or economize sound by superior conduction. A ring of water between the edge of the hearing tube and the solid sounding body will suffice for this result. The restriction of hearing to one ear is perfect, although the conditions of the ears and of the two limbs of the differential stethophone are precisely alike, with the exception of the

ring of water. As we form our notions of sounding bodies being on our right hand or on our left, by perceiving through which ear auditory sensations are acquired, and as water under the circumstances gives an augmentation of sound sufficient to restrict to one ear, an aural illusion may be produced by having two hearing tubes of equal length and of the same conditions brought in contact with two windows respectively, and placing under the cup of one of them a thin bag of water, which may be called a hydrophone. A church bell or a barrel organ will be heard only through the ear connected with the window having the water bag upon it, although these sounding bodies may be nearer the other window. The mind is led to believe that the sounding bodies are nearer the window which is the more distant from them.

In the case of some few sounds, the influence of water in modifying their tone is so great, that virtually a sound different in kind is heard. Thus, a watch, in Dr. Alison's possession, gives simply a short ticking sound to that ear connected with one cup of the differential stethophone held in the air; and imparts a full soft tick, or rather tack, and a musical bell sound to the other ear connected with the other cup of the instrument placed upon the thin bag of water lying on the watch. The sound of the watch is so modified by the different media, that as it were two different sounds are obtained, a sharp tick and a full soft tack, and though the watch-sound is conveyed in greater intensity to one ear than to the other, it is heard in both ears. No loss of sensation takes place, as in the case of the same sounding body, sounding through the same medium. The reason of this exception to the law of auditory obliteration, so to speak, is found in the fact that the sound is no longer one, but has become virtually two, by being conveyed through two different media, and it has been already stated that a major impression sensorially nullifies a minor in the case of its own sound only and of no other. The fine bell sound has been simply made audible by passing through water. It is probable that the double hearing of some persons which has been commented upon by physicians has been due to a difference in the two ears involving a disagreement in the media through which sounds have had to pass. The double hearing referred to has consisted of hearing the sounds of the same sounding body, very different in character in the two ears; the sounds in one ear being soft and in the other sharp, and so on. Perhaps, likewise, certain sounds inaudible in one ear have been rendered audible in the other, as in the case of the fine bell sound above referred to, by passing through better media. It is to be observed, that in order to have a sensation in this manner in both ears the sound must not preponderate greatly in one.

In the case of sounds conveyed to the ear through the bones of the head, a restricting intensity may be procured by closing the aperture of the external ear, as has been observed and commented upon by Mr. Wheatstone. A tuning-fork placed upon the middle of the forehead is heard in that ear only that is closed. The closure prevents the escape of sound, and promotes resonance to an extent sufficient to give the restricting intensity. This restriction of hearing to the closed ear in the case of sounds communicated through the bones of the head may be imitated by an analogous closing of the apertures of the differential stethophone. Sounds communicated in equal intensity to both limbs of the stethophone at some point between the closed apertures and the ear knobs are heard louder than when the apertures are open; and if one aperture only be closed, the sounds are heard in that ear only that is connected with the closed aperture. The wetted cotton of Mr. Yearsley—really a cotton and water membrane—and the gutta-percha membrana tympani of Mr. Toynbee, thus applied, greatly increase sounds conveyed to the stethophone at points between the closed apertures and the ear knobs. By closing one aperture with wetted cotton, and the other with gutta-percha, the comparative value of these appliances so far as intensification of sound communicated in the manner under consideration, may be tested. Both of these appliances have been found extremely beneficial in cases of deafness proceeding from perforate membrana tympani. It would appear that it is by some closure of the passages of the ear in persons partially deaf of one ear, that these persons hear sounds communicated through the bones of the head, in that ear only that is deaf, a fact ascertained in an extensive inquiry instituted by the author, and that had been previously observed in a few cases.

When one cup of the differential stethophone is held decidedly nearer a sounding body than the other cup, the sound is perceived, as it were, *in* the ear connected

with the nearer cup; but if the further cup be brought somewhat towards the sounding body, so as to obtain more sound, and to be more upon a par with the other cup, the sensation changes its seat, and is felt less *in* the ear and more towards the centre of the head, or the spot midway between the two ears. This centripetal character of sensation is more marked as the two cups attain to a parity, and when this is fully accomplished sensation is located at a central spot. If the cup, which was at first further from the sounding body, be now gradually brought nearer than the other cup, a further transition of sensation is produced; it leaves the central spot and moves towards the other ear, and becomes exclusively located there, as it was exclusively located at the first part of the experiment in the other ear. By alternately and rapidly bringing the cups nearer the sounding body, this movement of sensation may be rendered very striking.

Lastly, the differential stethophone affords an unfailing test of the existence of differences of intensity of sounds communicated by different bodies, solid, liquid, or gaseous. If consecutive trials be required on two bodies, this is done by using the two cups in succession, the necessary movements being effected without changing the position of the head, and with only a very little motion of the fingers. The contrast is readily made, and the difference, if any, with facility discovered. If both limbs of the instrument be simultaneously employed, and if the difference in the amount of the same sound conveyed to the instrument be material, an absolute test is procured at once; for, as has been already explained, no sound will be heard in one ear, and a full sound will be heard in the other. For example, a musical box placed upon the banks of the Serpentine, is heard in that ear which is supplied with that limb of the stethophone (an elongated one) whose cup is immersed in the river, and not at all in that connected with that limb whose cup is held upon the ground. In the same way this test of restriction of hearing to one ear, or of uno-aural hearing, is available for deciding upon the comparative acoustic value of different arrangements. If we desire, for instance, to know whether surrounding a glass with water and another with air, both filled with water and previously being equal in communicating sound to the stethophone, gives a difference of sound, the fact is immediately made known. The ear connected with the limb of the stethoscope immersed in the glass surrounded with water hears nothing, while the ear connected with the glass surrounded with air has a distinct sensation.

ON SOME PROPERTIES OF ICE NEAR ITS MELTING POINT.

BY PROF. FORBES.

Prof. Forbes has communicated to the Royal Society of Edinburgh the results of some experiments made by him on the properties of ice near its melting point, with particular reference to those of Mr. Faraday, published in the *Athenæum* for June, 1850, to which attention has been more lately called by Dr. Tyndall and Mr. Huxley, in relation to the phenomena of glaciers. The substance of Prof. Forbes's statement is as follows:—

"Mr. Faraday's chief fact, to which the term 'regelation' has been more lately applied, is this, that pieces of ice, in a medium above 32°, when closely applied, freeze together, and flannel adheres apparently by congelation to ice under the same circumstances.

"1. These observations I have confirmed. But I have also found that metals become frozen to ice when they are surrounded by it, or when they are otherwise prevented from transmitting heat too abundantly. Thus a pile of shillings being laid on a piece of ice in a warm room, the lowest shilling, after becoming sunk in the ice, was found firmly attached to it.

"2. Mere *contact*, without *pressure*, is sufficient to produce these effects. Two slabs of ice, having their corresponding surfaces ground tolerably flat, were suspended in an inhabited room upon an horizontal glass rod passing through two holes in the plates of ice, so that the plane of the plates was vertical. Contact of the even surfaces was obtained by means of two very weak pieces of watch-spring. In an hour and a half the cohesion was so complete, that, when violently broken in pieces, many portions of the plates (which had each a surface of 20 or more square inches) continued united. In fact, it appeared as complete as in another experiment where

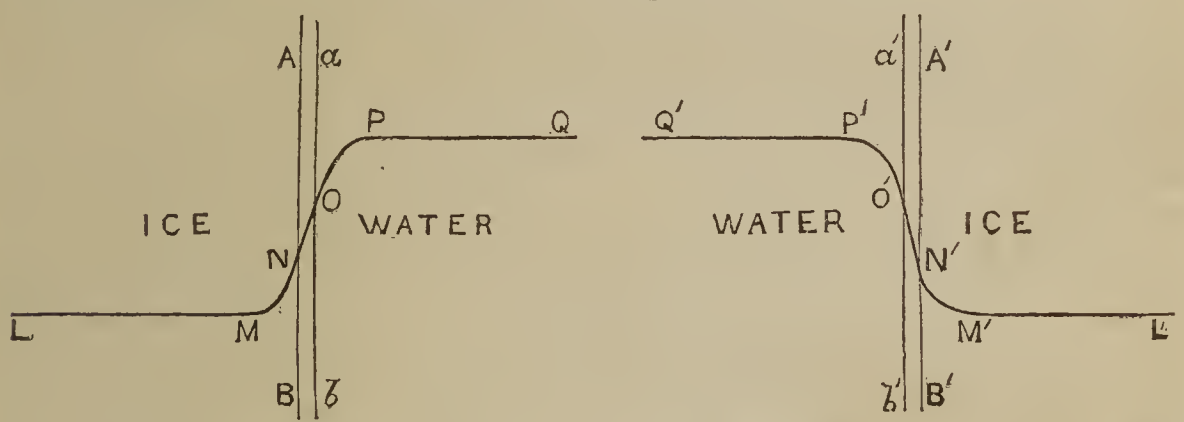
similar surfaces were pressed together by weights. I conclude that the effect of pressure in assisting 'regelation' is principally or solely due to the larger surfaces of contact obtained by the moulding of the surfaces to one another.

"3. Masses of strong ice, which had already for a long time been floating in unfrozen water-casks, or kept for days in a thawing state, being rapidly pounded, showed a temperature of 0°.3 Fahr. below the true freezing point, shown by delicate thermometers (both of mercury and alcohol), carefully tested by long immersion in a considerable mass of pounded ice or snow in a thawing state.

"4. Water being carefully frozen into a cylinder several inches long, with the bulb of a thermometer in its axis, and the cylinder being then gradually thawed, or allowed to lie for a considerable time in pounded ice at a thawing temperature, showed also a temperature decidedly inferior to 32°, not less, I think, than 0°.35 F.

"I think that the preceding results are all explicable on the one admission, that Person's view of the gradual liquefaction of ice is correct (*Comptes Rendus*, 1850, vol. xxx., p. 526),* or that ice gradually absorbs latent heat from a point very sensibly lower than the zero of the centigrade scale.

"I. This explains the permanent lower temperature of the interior of ice.



"Let AB be the surface of a block of ice contained in water at what is called the freezing temperature. That temperature is marked by the level of the line QP above some arbitrary zero. LM is, in like manner, the permanent but somewhat lower temperature possessed by the interior of the ice. The space, partly water, partly ice, or partaking of the nature of each, MNOP, has a temperature which varies from point to point, the portion NO corresponding to what may be called the physical surface of the ice between AB and *ab*, which is 'plastic ice,' or 'viscid water,' having the most rapid variation of local temperature.

"II. Such a state of temperature, though it is in one sense permanent, is so by compensation of effects. Bodies of different temperatures cannot continue so without interaction. The water *must* give off heat to the ice, but it spends it in an insignificant thaw at the surface, *which therefore wastes even though the water be what is called ice cold*, or having the temperature of a body of water enclosed in a cavity of ice.†

"This waste has yet to be proved; but I have little doubt of it; and it is confirmed by the wasting action of superficial streams on the ice of glaciers, though other circumstances may also contribute to this effect.

"III. The theory explains 'regelation.' For let a second plane surface of ice AB′ be brought up to nearly physical contact with the first surface AB. There is a double film of 'viscid water' isolated between two ice surfaces colder than itself. The former equilibrium is now destroyed. The films AB*ba* and A′B′*b*′*a*′ were kept in

* Quoted by me in 1851, in my sixteenth letter on Glaciers.

† "I incline to think that water, in these circumstances, may, though surrounded by ice, have a fixed temperature somewhat higher than what is called 32°. But I have not yet had an opportunity of verifying the conjecture.—[My idea is, that the invasion of cold from the surrounding ice is spent in producing a very gradual 'regelation' in the water which touches the ice, leaving the interior water in possession of its full dose of latent heat, and also of a temperature which may slightly exceed 32°. By similar reasoning, a small body of ice, enclosed in a large mass of water, will preserve its proper internal temperature *below* 32°; but, instead of regelation taking place, the surface is being gradually thawed. This is the case contemplated in the paragraph of the text to which this note refers.]"

N.B.—The words in brackets were added to this note during printing. 13th May, 1858. —J. D. F.

a liquid state by the heat communicated to them by the perfect water beyond. That is now removed, and the film in question has ice colder than itself on both sides. Part of the sensible heat it possesses is given to the neighbouring strata which have less heat than itself, and the intercepted film of water in the transition state becomes more or less perfect ice.

"Even if the second surface be not of ice, provided it be a bad conductor, the effect is practically the same. For the film of water is robbed of its heat on one hand by the colder ice, and the other badly-conducting surface cannot afford warmth enough to keep the water liquid.

"This effect is well seen by the instant freezing of a piece of ice to a worsted glove even when on a warm hand. But metals may act so, provided they are prevented from conveying heat by surrounding them with ice. Thus, as has been shown, metals adhere to melting ice.

"*Edinburgh, April* 19."—*Athenæum.*

THE FIRST GALVANO-ELECTRIC TELEGRAPH.

Dr. Hamel, of the Imperial Academy of Sciences at St. Petersburg (and the oldest corresponding member of the Society of Arts in London), has communicated to the Academy some results of his researches relative to the first development of galvanic and electro-magnetic telegraphy. Among other interesting facts, he shows that the youngest of Lady Palmerston's three brothers was the very first Englishman who ever saw a galvanic telegraph. It was the Russian Baron Schilling who, at Munich, so long ago as 1816, had invited the Honourable Frederick James Lamb, then British Envoy and Minister Plenipotentiary to the Court of Bavaria, to accompany him to Dr. Samuel Soemmerring, in order that he might see his telegraph, the first ever made to act by a galvanic battery. Schilling having introduced the British Minister to Soemmerring on the 2nd of July of the year mentioned (1816), repeated the visit with him ten days later, the 12th of July, when the telegraph was made to operate before them. Besides the brother of Lady Palmerston and the Russian Baron Schilling, there were on that occasion present also the Countess Banfy, Schilling's sister, and her husband, Count Banfy, from Vienna, then on a visit at Munich. Dr. Hamel proves that the date of Soemmerring's invention is nowhere accurately stated. His first telegraphic apparatus was made between the 9th July and 6th August, 1809. Baron Schilling, who was at that time attached to the Russian mission at Munich, saw it for the first time on the 13th August, 1810, and from that day he became an enthusiastic labourer in the field of electric telegraphy. In the autumn of 1812, he was enabled, by means of a subaqueous conductor, planned by him, in April and May, at Munich, to explode powder mines across the river Neva, near St. Petersburg. Subsequently, he made the very first electro-magnetic telegraph, a copy of which, in 1836, found its way through Bonn and Heidelberg to London. In 1837, there was at St. Petersburg a submarine cable making for him, with which he intended to unite Cronstadt with the capital, through the Finnish Gulf. His death, which took place on the 7th August, prevented the execution of this early submarine telegraph enterprise. Dr. Hamel remarks, that the Honourable F. J. Lamb, afterwards Lord Beauvale, who married in 1841, at Vienna, where he was more than ten years ambassador, the daughter of the Prussian minister there, Count Maltzahn, and who, in 1848, succeeded his elder brother, the second Viscount Melbourne, so well known as having been long Prime Minister of England, and after whom, in 1837, the present capital of the auriferous colony Victoria in Australia, was named, did not live to see the telegraph introduced there. He died on the 29th of January, 1853. About that time two gentlemen from Montreal, in Canada, Mr. Butcher and Mr. McGowan, left for Melbourne, in Australia, to establish from thence electro-telegraphic lines in various directions. The first, to Williamstown, was opened on the 3rd March, 1854, in the presence of the then Lieutenant-Governor Latrobe. Since last November, the capital of the colonies New South Wales and South Australia (Sydney and Adelaide) are both telegraphically united with Melbourne in Victoria. Ere long the continent of the distant fifth part of the globe (Australia) will, through Bass's Strait, be electro-telegraphically united with Tasmania, by means of a submarine cable, lately made at Mr. Henley's factory, at Enderby Wharf, near Greenwich.—*Journal of the Society of Arts.*

APPLICATION TO DYING OF A NEW MODE OF DECOMPOSING HYPOCHLORITE OF LIME.

BY M. SACC.

On being removed from the madder-bath, the tissues are found to contain on their surface a coating of colouring matter which gives them a dirty appearance. This was formerly removed by repeated immersion in bran or soap baths, and by exposure to the direct rays of the sun on the grass.

When Berthollet discovered the bleaching properties of chlorine, it was considered that the problem of rapid bleaching was solved; owing, however, to the difficulty of management and the irregularity of action in the chlorine water, this did not prove to be the case, and the old method of bleaching on grass was continued until Tennant substituted for free chlorine the hypochlorite of lime. For many years madder-dyed stuffs have been whitened by passing through solutions, more or less concentrated, of hypochlorite of lime or soda, at different temperatures.

Some years ago M. Steinbach conceived the idea of printing upon the stuffs to be bleached, with a solution of hypochlorite of lime, and then drying upon drums heated with steam, so as to decompose the hypochlorite into chlorate and chloride, and thus prevent any subsequent action. This method proved successful, and constituted a great improvement in the art of bleaching upon madder-dyed stuffs. It had the inconvenience, however, of sensibly browning the red and rose colours. To remedy this defect the author has tried the use of hypochlorite of zinc, or rather the products of its decomposition, which have been described by M. Balard in his paper on hypochlorous acid and its derivatives.

When a solution of hypochlorite of lime is decomposed by a quarter, a half, or an entire equivalent of sulphate of zinc, liquids are obtained possessing more and more energetic bleaching properties, and finally presenting all the characters of a solution of pure hypochlorous acid. The stuffs, when immersed in this solution, properly diluted, are perfectly bleached without any injury to the red and rose colours, which, indeed, appear to be improved. It is, however, impossible to print with this solution of hypochlorous acid, partly because it so rapidly decomposes, and partly because it attacks all organic matters with which it is brought into contact.

In order further to determine the non-existence of hypoclorite of zinc, the author substituted salts of zinc for tartaric acid, and produced the whites upon coloured tissues, which were afterwards immersed in solution of hypochlorite of lime. This experiment answered perfectly, and it also enabled him by increasing or diminishing the amount of the zinc salt, to modify the energy of the mordant so as to produce different shades of colour, some of which are purer and more distinct than those obtained by any other process.

The following is the mode of operation.—

The tissues previously dyed and soaped, are printed upon by the roller with the following mixture:—sulphate of zinc, 400 grammes; gum, 500 grammes; water, 1 litre. When the impression is dry, the tissue is immersed for two minutes in a cold bath of hypochlorite of lime. It is then well washed and dried.—*Comptes Rendus.*

THE RELATIVE ADVANTAGES OF ETHER AND CHLOROFORM.

At the last sitting of the Imperial Society of Medicine of Lyons, the important question of the relative advantages of ether and chloroform as anæsthetics was fully discussed. Dr. Barrier stated that, to his knowledge, there were only three well authenticated cases in which ether had caused death, and that even in those there were some extenuating circumstances. The deaths caused by chloroform, on the contrary, were numerous. If, therefore, ether was slower in its action, and more disagreeable in its effect, it was, on the other hand, infinitely less dangerous. Dr. Pétrequin, following on the same side, drew a parallel between the means possessed by science for counteracting the dangerous effects either of ether or chloroform, and showed that in this respect the latter was greatly inferior to the former. Several other members expressed similar opinions, without there being a single voice in favour of chloroform; and at length the society, on the motion of Dr. Barrier, passed the following resolution:—1. "That ether, used as an anæsthetic, is less dangerous than chloroform. 2. That anæsthesia is produced as constantly and completely by ether as by chloroform. 3. That if ether presents inconveniences from which chloroform is exempt, such inconveniences are of slight importance, and are preferable to the danger inherent to the use of the latter. 4. That consequently ether is to be preferred to chloroform."

PROPOSED SUBSTITUTES FOR COD-LIVER OIL.

The oil of the dugong has been proposed as a substitute for cod-liver oil. Dr. Hobbs, medical health officer of Moreton Bay, Australia, states that he has used it with great success in those cases in which cod-liver oil is usually prescribed. The dugong is very abundant in the Australian waters, and yields a sweet and palatable oil, which is very digestible. It does not contain any iodine. The *Dublin Medical Press* observes that the dugong is a mammal, and, consequently, the oil is different from that of a fish, and probably of the same nature as that of whales, which, the writer suggests, might be extracted by cold pressure instead of the mode now practised.

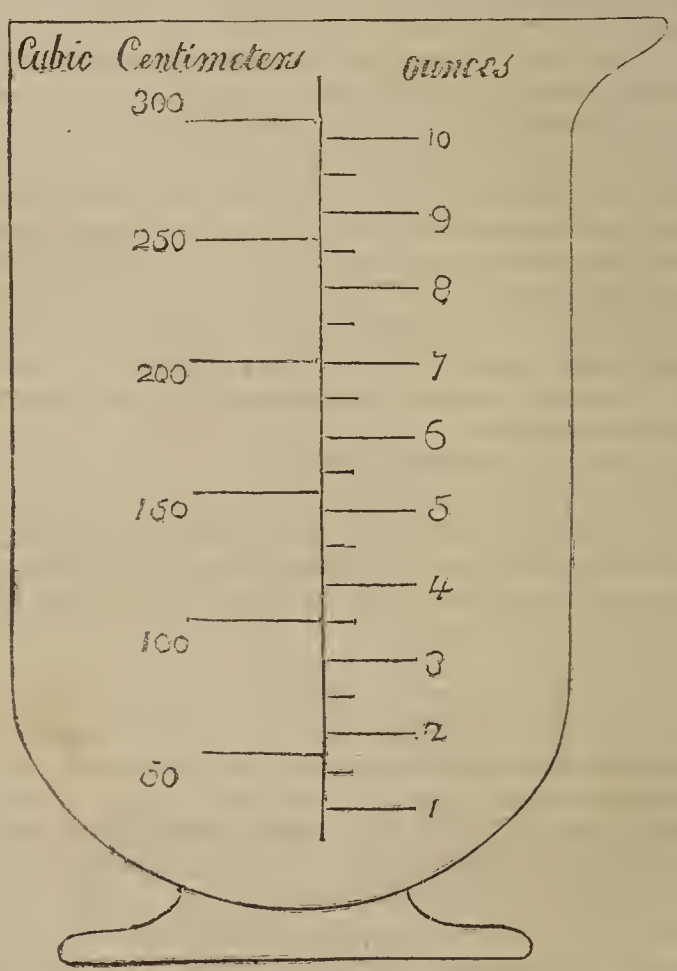
Pilcher Oil has also been proposed as another substitute by Dr. Andrews, of West Malvern, who states in the *Lancet* of May 14th that he has found this oil a very good substitute for cod-liver oil. The advantages it possesses over the latter are, that it is not so disagreeable to take, does not rise, and gives general tone to the system much more than cod-liver oil.

Dr. Andrews has generally given it combined with iodide of iron, in proportion of two grains to the fluid ounce.

NEW MEASURE-GLASS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—With a view to get our body acquainted with the metrical system as soon as possible, I have had some 10 oz. measure glasses graduated thus:—



Messrs. Gilbertson & Sons, and Mr. Thomson, the medicine chest maker, have made them for me, and I find them quite accurate; the addition of the cubic centimetres in no way interferes with the utility of the measure, and it is a means of keeping before our eyes their relative value in comparison with the imperial ounce.

I am, Sir, your obedient servant,

P. Squire.

277, *Oxford Street, London, W., June* 24, 1859.

SUICIDE BY CORROSIVE SUBLIMATE.

On Wednesday, May 25th, Mr. Wakley resumed an inquest, at the Golden Lion, Fulham, on Mr. Charles Edward White, aged 70, proprietor of extensive pottery works in Fulham. It appeared that the deceased had latterly beeome very desponding, arising from his connexion with a young woman, with whom he had cohabited for the last eight months. He was last seen in her eompany on Friday night, the 13th, when high words passed between them. He was on the premises next day as late as half-past five P.M. At six o'clock, when the men were to be paid, the foreman went to the counting-house and found the door loeked inside, and he saw through the window the deceased sitting in a chair, apparently insensible. Mr. Gillingham, surgeon, made a *post mortem* examination, but could not discover the cause of death. The inquest was then adjourned for the analysis of the stomach by Dr. Riehardson, who found eorrosive sublimate in large quantities. Mr. Roulton, the foreman, said, on the Sunday morning he found a pieee of paper in the stove marked "Strong Poison," but did not like to mention this on the last oceasion (when he distinctly said that he found no paper), beeause he did not wish to hurt the feelings of Miss White, who was present. The Coroner observed that witness should have mentioned it, as it might have prevented the jury from attending that day. It released any person from the charge of murder. The witness handed the piece of paper to the coroner, but he and the jury were unable to diseover the words. The foreman said the paper was scorched, but on putting the pieees together he could distinctly read the words "Strong Poison." The jury then returned a verdict—"Died from poison, but how administered there was no evidenee to show."

SUICIDES BY PRUSSIC ACID.

On Monday, May 30th, Mr. Wakley resumed an inquest, which was opened formally by him on Saturday, at the Castle publie-house, in the Holloway Road, relative to the death of a young man named John Andrew Cooper Huddleston, the son of Mr. Huddleston, surgeon, of Cornwall Terraee, Holloway, who was found dead in a field between Claremont Cottages and the Great Northern Railway, off the Holloway Road, on the 26th of May. The deceased, it appeared, had been brought up to the medical profession, and had been with Dr. Bainbridge. He purehased half an ounce of prussic acid at Hooper's, Pall Mall East, where he was known through his eonnexion with Dr. Bainbridge, the greater part of whieh he took to put an end to his existence. Among the letters found upon him, was one addressed to the jury that should sit upon him, explaining why he committed the aet of self-destruetion, and aecusing his father of negligence. Mr. Holmes Coote and Mr. Mitehell had made a *post mortem* examination of the body and head, and they could trace no sign of mental disease. It was stated that the deceased had slept in the New Cattle Market, and had only had a penny loaf to subsist on for three days, and from duplicates found upon him it was evident he had been pledging sueh articles as only a person in the extremity of distress would so dispose of. Mr. Close, an oilman, stated that he had taken in the young man out of eharity, and that deceased had complained to witness of the treatment he had been subjected to by his father. Mr. J. N. Huddleston, the father of the deceased, said his son ceased to reside with him about January, 1858, in consequence of his having carried a knife with whieh he threatened to murder witness, and had on one occasion stopped his horse. In April last, feeling alarmed, he had ealled in the aid of the police. In answer to a question by a solieitor, who attended on behalf of the mother and some of the creditors of deceased, witness said he believed his son did say that he was starving with hunger, or words to that effeet. Among the papers found on the deceased was one apprising him of a situation of £40 a year, with board and lodging, which the coroner said would go to show that he had still some prospect when he committed the rash act, as the letter was dated but a few days before he took the poison. The jury agreed to a verdict, "That the deeeased died from the effects of poison administered by his own hand, but that there was no evidence to satisfy them as to the state of his mind at the time."

On Saturday, June 4, Mr. Wakley held an inquest at the Rainbow Tavern, Liverpool Road, Islington, touching the death of Captain William Arnold Wallinger, aged thirty-four, late of the 1st West India Regiment, and son of Mr. Serjeant Wal-

linger, who committed suicide by swallowing a quantity of prussic acid. It appeared from the evidence that the deceased had lodged at 61, Gibson-square, since Christmas last, and he was somewhat irregular and intemperate in his habits, but there was nothing in his manner to lead to the supposition that he would commit suicide, although it subsequently transpired that he had twice made the attempt. However, on the day of his death, his non-appearance at the usual hour excited suspicion, and the landlady entered his room, when she found him lying on the floor with a phial that had contained prussic acid by his side. She immediately sent for Mr. G. Harslip, surgeon, who, upon his arrival, pronounced life extinct. There was a strong smell of prussic acid at the deceased's mouth, and the *post mortem* examination proved that he had drunk a large quantity of that poison. The phial found by his side was an ounce bottle, and it seemed probable that he drank the whole of the contents. A note written by the deceased was discovered on the table addressed to his father, in which he spoke of his past life in terms of bitter self-reproach. The coroner briefly summed up, and the jury returned a verdict of suicide, leaving the state of his mind an open question. The inquiry then terminated.

ALEXANDER VON HUMBOLDT.

This eminent German philosopher and naturalist died on the 6th of May last, in his ninetieth year. Frederick Henry Alexander Humboldt was born at Berlin, on the 14th of September, 1769, of an ancient Pomeranian family. His father, Major Humboldt, was aide-de-camp to the Duke of Brunswick during the seven years' war, afterwards chamberlain to the King of Prussia. The mother, who appears to have been a highly intellectual woman, was a cousin of the Princess of Blucher, and, at the period of her marriage to Major Humboldt, the widow of Baron Holwede. The result of her last marriage was the birth of two sons, who were both destined to play an important part in the history of their country. The father died about twelve years after his marriage; the care and instruction of the two children, therefore, devolved entirely upon the mother, and it is to her they were indebted for that judicious training which served to develop their intellectual capacities and to guide the labours of their after-life. William, the elder by rather more than two years, principally devoted himself to literature and art, and his highest achievements were in the department of philology. He was, however, best known as a politician, having filled a succession of diplomatic and administrative offices for nineteen years.

The early instructors of Alexander Humboldt, in addition to his mother, were Campe, the author of *Robinson Allemande*, and Christian Kunth, who remained up to his death the constant friend and adviser of his former pupil. He afterwards, in 1783, studied under the Professors of the Berlin University, and his first knowledge of Botany was derived from the celebrated Wildenow. In 1786 he went to the University of Frankfort, and from there to Gottingen, where it is stated he composed an essay on the Textile Fabrics of the Grecians, but which was never published. It is at this time that he became acquainted with the English traveller George Forster, with whom he made a number of exploring excursions, and which resulted in the publication of a work, in 1790, on the *Basalts of the Rhine*. He then went from Gottingen to Hamburg, and from thence to the Mining School at Frieberg, where he studied under the celebrated Werner, with whom he was a great favourite. Here he qualifed himself for the office of Mining Director in the Principalities of Beyreuth and Anspach, which position he held up to the year 1795, and it is during this period that he collected the materials for several of his earlier works. In 1796, the death of his mother removed the restraint which had prevented him from carrying into execution the idea he had formed during his acquaintance with Forster, namely, to make a great exploring voyage.

Humboldt now, therefore, seriously devoted himself to the acquirement of that knowledge which would be most essential to him in his travels. Together with Leopold von Buch he carefully studied all the phenomena connected with meteorology, and proceeding to Paris he possessed himself of the best instruments, perfecting himself, as far as possible, in their use. During his stay in this capital he met with M. Aimé Bonpland, who became the future companion of his travels.

Humboldt had intended to join the Baudin expedition, which was fitting out by the French for the exploration of South America; but impatient of delay he left Paris for Madrid, accompanied by Bonpland. The young travellers here obtained special recommendation and notice from the Spanish Court, and having paid a hasty visit to Egypt, they, in May, 1799, sailed from Corunna, escaping through the English blockade to the Island of Teneriffe. From thence they crossed to Cumana, in South America, where they first experienced the terrible phenomena of an earthquake. And now, for five years, Humboldt and his companion were engaged in travel, exploring the forests and wildernesses of the Spanish possessions, and collecting a mass of scientific observations of the most extensive order, including astronomical determinations, terrestrial surveys, and researches into the botany, geology, and mineralogy of the districts through which they passed. They navigated the Oronoko and other large rivers in a canoe, resting for a time at the town of Angostura. They afterwards passed up the River Amazon, and in 1802 they reached Quito. Here they stopped for several months, making a most complete exploration of the whole district, and in June of this year they ascended Chimborazo to the height of 19,300 feet, the greatest elevation that had been then attained. Mexico, Cuba, and the United States were then visited, and in 1804 Humboldt returned to Paris with the most extensive collection that had been seen in Europe, consisting chiefly of botanical, mineralogical, and geological specimens, together with the means of illustrating the whole natural history of the regions through which he had travelled. Humboldt now spent several years of hard work in Paris, preparing a series of works descriptive of his voyage.

These important publications were enriched by the contributions of several eminent men of science, and his own division of the work was a specimen of the highest order of scientific literature. In 1818, Humboldt revisited Italy with Gay-Lussac, whom he had assisted in making investigations into the composition of the atmosphere. He afterwards visited England, and then returned to reside at Berlin, where he became a favourite of the king, and was made a Councillor of State.

In 1829, Humboldt, in association with Rose and Ehrenberg, started on a second journey of scientific exploration, travelling to Siberia, and exploring Central Asia to the very confines of China. This expedition, which was undertaken at the express request of the Russian Government, who bore all the expenses, although it only occupied nine months, was exceedingly rich in results. The travellers distributed most valuable information in the districts through which they passed, more especially the mines of Siberia; they also instituted observatories at various points, and determined some most important facts in connexion with terrestrial magnetism. The store of knowledge and information thus amassed was afterwards published in the *Fragmens Asiatiques*, the *Asie Centrale*, and Rose's *Reise nach dem Oural*. Previous to this period Humboldt had commenced that great work which more than any other has contributed to his immense reputation. The vast generalization which he has attempted to realize in *Cosmos*, had been the long-cherished idea throughout all his travels and studies, and for which he worked so perseveringly to master the various branches of science that he might connect them into one harmonious whole, and present a perfect picture of all the varied phenomena of nature.

It is impossible to give more than a faint outline of the labours of Humboldt. His influence on the progress of science has been very great, and scarcely any extensive inquiry has been originated during the last fifty years in which he has not taken part. He has published numerous books and papers on various branches of science; he is, however, best known by his great exploration of South America, and as the author of *Cosmos* and the *Aspects of Nature*.

Humboldt was the habitual friend and adviser of the King of Prussia, and was charged by that sovereign with several political missions. His death was the occasion of universal mourning in Berlin, and his body was interred with all the pomp and ceremony of a state funeral, the Prince Regent, the Ministers of State, and the élite of the city taking part in the ceremony.

BOOKS RECEIVED.

On the Influence of White Light, of the different Coloured Rays and Darkness, on the Development, Growth, and Nutrition of Animals. By Horace Dobell, M.D., &c.

On the Action of Hard Waters upon Lead. By W. Lauder Lindsay, M.D., F.R.S. Edinburgh: printed by Neill & Co. 1859.

TO CORRESPONDENTS.

Mr. Pooley (Bath) suggests the use of a graduated label for 6 and 8 ounce bottles where the dose of the medicine is in table-spoonfuls. The label consists of a narrow slip of paper, with the word "table-spoonfuls," and graduated according to the size of the bottle, the object being to avoid the necessity of measuring by a table-spoon where a graduated glass is not used.

A Registered Apprentice (London).—(1.) Chlorodyne is a proprietary medicine, the composition of which has not been published.—(2.) Yes.

I. J. (Wandsworth) regrets that apprentices should have been spoken of at the late General Meeting as possessing such obtuse intellects.

A. P. S. (London).—In the label referred to, the words "*not to be taken*" should be added.

"*A Member of Ten Years' Standing*," failing to pay his subscription, would not appear on the Register, and therefore could not legally assume or use the title of Pharmaceutical Chemist.

E. B. V. (Belgravia) calls attention to the Benevolent Fund, the real nature of which, he thinks, is not generally known, and suggests that the requisite information should be fully circulated among the Members, with the view of adding to the Fund.

Juvenis (Hoxton).—*Fruit Essences*, vol. xi., page 214.

A Subscriber (Islington).—(1.) Cantharides should be kept in well-stopped bottles; when so preserved their vesicating property is not diminished. (2.) For the purpose of preventing friction, which would injure its appearance.

J. D.—Tinct. Sumbuli. See vol. xv., p. 508, of this Journal; also Beasley's *Pocket Formulary*.

J. R. N.—The formulæ required will be found in vol. iv., p. 243, of this Journal.

J. C.—M. P. S. (Wandsworth).—The result described is no doubt due to the action of oxide of zinc from the boiler, decomposing the soap and forming an insoluble soap.

F. H. C. (Southport) suggests an alteration in the formula for tincture of calumba, with the view of obviating the difficulty at present experienced in making it bright by filtration. He proposes the following process:—The quantities of the ingredients for the tincture having been calculated, infuse the finely sliced calumba in the water, boiling, and when cold boil it in the infusion for a minute or so; when again cold, make up the quantity lost by evaporation, and add sufficient rectified spirit to make the tincture proof strength; then let it digest in the usual manner.

A Member, B. E. (Huddersfield).—The purple dye prepared from certain constituents of coal tar, is a patented article. It has already been noticed in the Journal, but we may, perhaps, give some further account of it.

A. B., a Member.—The process of percolation or displacement has been described in several articles in this Journal, but the subject is by no means exhausted. In conducting this process a great deal of practical information is required with reference to the modifications rendered necessary by the different substances operated upon.

T. H. (Manchester).—We know of no formula for concentrated mixture of ammoniacum.

M. P. S. (York).—*Solution of Persesquinitrate of Iron.* See vol. vii., page 596; and vol. xi., page 328.

An Associate (Bishop Aukland).—*German Yeast.* Vol. xvii., page 600.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

LIST

OF THE

MEMBERS, ASSOCIATES, AND APPRENTICES

OF

The Pharmaceutical Society of Great Britain.

1859.

MEMBERS OF THE COUNCIL.

PRESIDENT.

* Jacob Bell, 338, Oxford Street.

VICE-PRESIDENT.

Thomas N. R. Morson, 38, Queen's Square, Bloomsbury.

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Bird, William Lionel .....42, Castle Street, Oxford Street.
Bottle, Alexander .....37, Townwall Street, Dover
Brew, Thomas A.....71, East Street, Brighton
Bucklee, William Henry.....86, New Bond Street
Cupiss, Francis.....Diss
Davenport, John Thistlewood...33, Great Russell Street, Bloomsbury
Deane, Henry .....Clapham
Edwards, George.....Dartford
Edwards, John B. .....50, Berry Street, Liverpool
Herring, Thomas.....40, Aldersgate Street, City
Hollier, Elliott.....Market Place, Dudley
Lescher, Joseph Sidney .....60, Bartholomew Close
Macfarlan, John F. .....17, North Bridge, Edinburgh
Meggeson, George .....61, Cannon Street, City
Sandford, George Webb .....47, Piccadilly
Squire, Peter .....277, Oxford Street
Standring, Thomas.....1, Piccadilly, Manchester
Waugh, George .....177, Regent Street

SECRETARY AND REGISTRAR.

Elias Bremridge, 17, Bloomsbury Square.

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* Died June 12th, 1859.

HONORARY MEMBERS.

Boudet, Felix, Membre de l'Académie de Médecine, Paris.
Brande, William Thomas, F.R.S., Royal Mint, London.
Cap, P. A., Correspondant de l'Académie de Médecine, Paris.
Christison, Robert, M.D., F.R.S.E., Edinburgh.
Clark, Thomas, M.D., Aberdeen.
Cleghorn, Hugh F. C., M.D., Madras.
Coindet, —, M.D., Geneva.
Daniell, William Freeman, M.D., F.L.S.
De Vry, John Elishee, M.D., Bandong, Java.
Dorvault, François Laurent Marie, Directeur de la Pharmacie Centraledes Pharmaciens, Paris.
Farre, Frederic John, M.D., No. 7, Montague Street, Russell Square.
Garrod, Alfred Baring, M.D., F.R.S., No. 84, Harley Street, Cavendish Sq.
Graham, Thomas, M.D., F.R.S., Master of the Mint, London.
Guibourt, Nicolas Jean Baptiste Gaston, Membre de l'Académie de Médecine, Professeur à l'Ecole de Pharmacie, Paris.
Hamberg, N. P., M.D., Stockholm.
Hare, Robert, M.D., Philadelphia.
Herapath, William, F.C.S., Bristol.
Hoffmann, Augustus William, LL.D., Ph.D., F.R.S., 9, Fitzroy Square.
Holst, Frederik, Christiania.
Landerer, Xavier, M.D., Athens.
Liebig, Baron Justus von, M.D., F.R.S., Munich.
Lindley, John, Ph.D., F.R.S., F.L.S., Acton Green, near London.
Maclagan, Douglas, M.D., F.R.S.E., Edinburgh.
Martiny, Eduard, M.D., Salzschlirf, Hesse Cassel.
Martiny, Julius, M.D., Gaualgesheim, Hesse Darmstadt.
Martius, Carl Friedrich Philipp von, M.D., F.R.S., Munich.
Martius, Theodor Wilhelm Christian, M.D., Ph.D., Erlangen.
Mialhe, —, M.D., Professeur agrégé à la Faculté de Médecine, Paris.
Miller, William Allen, M.D., F.R.S., King's College, London.
Mitscherlich, Eilert, F.R.S., University of Berlin.
Mohr, Friedrich, M.D., Coblentz.
O'Shaughnessy, Sir William Brooke, M.D.
Pelouze, —, Membre de l'Académie des Sciences, Paris.
Procter, William, Jun., Philadelphia.
Rees, George Owen, M.D., F.R.S., No. 26, Albemarle Street, Piccadilly.
Reid, David Boswell, M.D., F.R.S.E, Edinburgh.
Rose, Heinrich, M.D., F.R.S., Berlin.
Schomburgk, Sir Robert Hermann, K.H., H.B.M. Consul, Bangkok.
Schweitzer, Edward Gustavus, F.C.S.
Stenhouse, John, LL.D., F.R.S.
Taylor, Alfred Swaine, M.D., F.R.S., No. 15, St. James's Terrace, Regent's Park.
Thwaites, G. H. K., F.L.S., Peradenia, Ceylon.
Ure, Alexander, A.M., F.R.C.S., No. 18, Upper Seymour Street, Portman Square.
Weddell, H. A., M.D., F.L.S.
Wilson, George, M.D., F.R.S.E., Edinburgh.
Wood, George B., M.D., Philadelphia.

FOREIGN AND COLONIAL LIFE MEMBERS.

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1851		Alexander, James Lyon	Sydney
1858	486	Avice, Charles Ernest	Mauritius
1848	34	Baeër, Gustave E.	Strasbourg
1855	401	Baissac, Pierre Joseph	Mauritius
1852	167	Baschet, George Constant	Mauritius
1858	505	Baschet, Pierre Edmond	Mauritius
1849		Baylis, William	Launceston, Tasmania
1852		Bishop, William [a]	Wellington, N. Zealand
1858	506	Boullé, Janvier Alfred	Mauritius
1852		Carpenter, Henry	Demerara
1854	347	Dru, Casimir Theodore A.	Mauritius
1850	74	Fleurot, Emile	Mauritius
1855	389	Francis, Henry	Melbourne
1853		Guiot, Jean Felix E.	Mauritius
1850	82	Lamusse, Louis A.	Mauritius
1847		Lediard, Charles	St. Vincent
1847	28	Mailloux, Joseph	Mauritius
1851	93	Mailloux, Auguste	Mauritius
1858	508	Minet, Alphonse Edouard	Mauritius
1847	19	Nobrega, Gerardo Jose da	Madeira
1855	407	Noël, Ferdinand	Mauritius
1852	118	Regnaud, Charles	Mauritius
1850		Roberts, Henry	Florence
1852		Roberts, Thomas H.	Gibraltar
1843		Rogers, Henry	Bombay
1852	72	Sinimberghi, Nicholas	Rome
1858	467	Skinner, Henry	Kingston, Canada West
1844	1	Sparks, John	Bombay
1844		Stewart, F. H.	Demerara
1857	468	de Valancé, Charles P.	Mauritius
1859		White, Robert	California

The figures in the second column correspond with the number of the Certificate of Examination.

LONDON MEMBERS.

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1850	70	Allchin, Alfred ..	32, Cole's Terrace, Islington
1843		Allen, George	7, Cowper Street, City Road
1841		Allen, William	2, Morgan's Place, Islington
1853		*Ambrose, John	1, Union Place, Commercial Road
1844		Ambrose, Thomas	94, Whitechapel Road
1842		Anderson, Charles	23, Lower Belgrave Street
1857	241	Andrews, Frederick	8, Store Street
1842		Appleton, Thomas Cass	45, Curzon Street
1841		Ashton, William	154, Sloane Street
1853		Attwood, Alfred	61, Cannon Street
1841		Austin, Henry	161, Bermondsey Street
1853		Bailey, Delamore J.	30, Conduit Street
1857	242	Baines, William H.	61, Cannon Street, City
1841		Baiss, William A.	102, Leadenhall Street
1841		Baiss, James	102, Leadenhall Street
1841		Baker, William J.	21, Brecknock Place, Camden Town
1845		Ball, Thomas M.	77, St. George's Road, Southwark
1841		Balmer, John	94, St. John Street Road
1841		Barber, Thomas A.	2, Scott's Place, Islington
1842		Barber, Joseph	7, Orange Street
1856		Barkley, William	18, Little Tower Street
1848		Barnard, John	1, Oxford Terrace, Clapham Road
1853		Barnes, James B.	1, Trevor Street, Knightsbridge
1853		Barron, Frederick	2, Bush Lane
1858	504	Barrs, John Adcock	55, Fore Street, City
1841		Barry, John T.	Plough Court, Lombard Street
1841		Bartlett, William	1, Brettin Place, Chelsea
1844		Bastick, William	2, Brook Street
1841		Bayley, Edmund	26, Leadenhall Street
1851		Beaton, John	174, Shoreditch
1853		*Becket, William E.	6, Giltspur Street
1841		*Bell, Jacob	338, Oxford Street
1853	17	Bell, William Henderson	48, Albany Street, Regent's Park
1842		Bentley, William	11, Mount Street, Bethnal Green
1847		Berry, Edward	1, Prospect Place, Dalston
1841		Best, John D.	26, Suffolk Street, Pall Mall
1841		Bigg, Thomas	Great Dover Street
1855	270	Biggs, Walter	19, Notting Hill Terrace
1842		Binge, Thomas	23, Stockbridge Terrace, Pimlico
1841		Bird, William L.	42, Castle Street East
1850	57	Bird, Augustus	22, High Street, Kensington
1859	322	Bishop, Alfred	Mile End New Town
1843		Blake, Charles T.	47, Piccadilly
1842		Bland, John	57, Penton Street, Pentonville
1841		Blandford, John F.	9, Bruton Street
1853		Bolton, William	146, Holborn Bars
1842		Bond, Henry	11, Cross Street, Hoxton New Town
1853		Boothby, Henry Neal	72, Crawford Street
1842		Boully, Peter	Queen's Road, Bayswater
1849		Bourdas, Isaiah	10, Pont Street, Belgrave Square
1842		Bowden, Edward	13, Charles Street, St. James's
1852		Bower, William	96, Tottenham Court Road

* Life Members.

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Bradley, John	21, Belgrave Road, Westminster
1847		Brewer, Eli	43, Duke Street, Manchester Square
1857	50	*Brewer, John W. N. T.	5, Liverpool Street, City
1853	190	Bromley, Richard Martin	Denmark Hill
1845		Brooks, Charles	Southville, Wandsworth Road
1853		Brotherton, William H.	1, Clyde Terrace, Caledonian Road
1842		Brown, James	27, Aldgate
1842		Buck, Thomas	Kingsland Green
1842		Buckle, Christopher F.	3, North Place, Gray's Inn Road
1846		*Bucklee, William H.	86, New Bond Street
1845		*Burden, Edward	38, Duke Street, Grosvenor Square
1846		Burden, Thomas	6, Store Street, Bedford Square
1841		Burfield, Henry	180, Strand
1853		Burgoyne, James	31, Throgmorton Street
1857	333	*Butt, Edward Northway	235, Oxford Street
1855		Carr, John	171, High Holborn
1853		Carrick, James	46, Churton Street, Belgrave Road
1853		Carty, John	172, New Bond Street
1853		Cattell, George	Homerton
1853		Chard, Frederick J.	13, Eccleston Street South
1853		Chubb, James C.	59, St. John Street, Clerkenwell
1845		Clarke, Benjamin	Mare Street, Hackney
1841		Cobb, Robert C.	10, Frederick Place, Hampstead Road
1853		*Cockrill, James	2, Wellington Street, Waterloo Town
1849		Cocksedge, Henry B.	20, Bucklersbury
1852		Colchester, William M.	2, Crown Street, Hoxton
1849		Cole, William H.	52, Gracechurch Street
1842		Coles, John	New Road, Camberwell
1854	191	Coles, Charles	72, Euston Square
1845		Collins, John R.	Haverstock Hill
1853		Collins, Robert N.	Oxford Court, Cannon Street
1841		Compton, Charles	14, Brewer Street, Golden Square
1841		Constance, William	5, Hanover Place, Regent's Park
1848		Constance, Edward	37, Leadenhall Street
1853		Cooke, John	171, Hoxton Old Town
1848		Cooper, William T.	26, Oxford Street
1853		Cooper, Robert H.	20, Royal Exchange
1847		Corfield, Daniel	22, Thrawl Street, Spitalfields
1853		Cornelius, Joseph	Clapham
1848		Cowdery, George T.	36, Paternoster Row
1845		Cracknell, Charles	107, Edgware Road
1859		Crispe, James	4, Cheapside
1858		Crocker, Edwin	19, Richmond Road, Islington
1853		Cross, Henry	4, Shepperton St., New North Rd.
1841		Croucher, John T.	223, High Street, Shadwell
1853		Croyden, Charles	37, Wigmore Street
1842		Cullen, William	37, Beckford Row, Walworth
1852		Curtis, Frederick	15, Crawford Street
1853		Darby, Stephen	140, Leadenhall Street
1842		Davenport, John T.	33, Great Russell Street, Bloomsbury
1841		Davies, Charles	11, Claremont Place, North Brixton
1845		Davies, Henry E.	43, Wood Street, City
1841		*Davy, Charles	100, Upper Thames Street
1841		Deane, Henry	Clapham
1850		Dickinson, William	16, Cambridge Street, Edgware Road

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Doughty, Edward William.	4, William Street, Knightsbridge
1841		Down, John	1, Queen's Road, Bayswater
1841		Drew, James	2, Bush Lane, Cannon Street
1859	352	Dyson, William B.	4, Gloucester Rd., South Kensington
1847		Eardley, John	14, Charles St., Westbourne Terrace
1841		Eddy, Charles W.	30, Crown Street, Finsbury
1853		Edwards, William S.	14, Eltham Place, Old Kent Road
1853		Elam, Benjamin	196, Oxford Street
1853		Elkington, Edward	56, Grange Road, Bermondsey
1849		Ellis, George H.	4, Pavement, Finsbury
1853		Elvey, Thomas	8, Halkin Street, West
1841		Evans, John	60, Bartholomew Close
1851		Evans, John H.	60, Bartholomew Close
1841		Farmar, Robert A.	40, Westminster Road
1841		Faulconer, Robert H.	Keen's Row, Walworth
1853		Fells, John	Stockwell
1853		Fenn, John T.	83, Regent Street, Westminster
1841		Field, William	27, Queen's Buildings, Brompton
1856	88	*Field, James John.	18, Chichester Street, Paddington
1842		Fincham, Robert	57, Baker Street
1847		Fincham, Zacariah C.	57, Baker Street
1858	445	Ford, Charles	27, Canonbury Place
1858	160	Forrest, Richard	9, Celbridge Place, Westbourne Park
1842		Foulger, Samuel	133, St. George's Street, East
1841		Fowler, Richard	14, Brewer Street, Golden Square
1841		Fox, William	48, Church Street, Bethnal Green
1856		Francis, George B.	2, High Street, Islington
1857		Francis, George	5, Park Lane
1841		Freeman, John	13, Blackfriars Road
1853		Freeman, Richard	5, Clayton Place, Kennington Road
1843		*Freeman, Robert	38, High Street, Kensington
1853		Gadd, Charles	1, New Bridge Street, Vauxhall
1842		Gale, Henry	3, Millbrook Place, Camden Town
1854	78	Gale, Samuel	338, Oxford Street
1841		Galliers, George	230, Tottenham Court Road
1841		Garden, Alexander	372, Oxford Street
1843		Garden, Felix R.	372, Oxford Street
1841		*Garle, John	12, Kensington Terrace
1858		Gedge, William Stedman	77, St. John Street
1850		*Gerard, Philip Augustus	390, Strand
1848		Gigner, John	King's Road, Chelsea
1843		Gill, George W.	15, Crown Place, Walworth
1842		Glover, George	19, Goodge Street
1841		*Gloyne, Charles	5, Terrace, Kensington
1842		Goddard, John D.	6, Arthur Street, City
1853		Golding, William	42, Upper Albany Street
1842		Goodbarne, Thomas	13, Charles Place, Charles Square
1842		Goodbarne, Thomas R.	Hornsey Road
1853		Goode, Thomas	47, Minories
1847		Goodger, David	31, Regent Street
1853		Goosey, William	5, Ocean Row, Stepney
1853		Gorton, John G.	144, High Street, Whitechapel
1854		Gosden, Henry	140, Leadenhall Street
1856		Gould, John	Chicksand Street

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1853		Gould, John Granger	198, Oxford Street
1853		Green, Josiah James	6, Henry St., Avenue Rd., St. John's Wood
1847		Greenish, Thomas	20, New St., Dorset Sq.
1851		Greenwell, Baker	Queen's Terrace, St. John's Wood
1842		Griffiths, John	Clerkenwell Green
1853		Grisdale, John M.	216, Tottenham Court Road
1853		Gristock, Thomas	42, South Street, Manchester Square
1851		Gulliver, William	33, Lower Belgrave Street
1853		Hackman, Leonard L.	41, Union Street, Bishopsgate Street
1853		Haine, John	Allen Road, Stoke Newington
1853		Hall, John Heaton	309, High Holborn
1857		Hall, Robert	18, Wigmore Street
1841		Hanbury, Cornelius	Plough Court, Lombard Street
1841		*Hanbury, Daniel Bell	Plough Court, Lombard Street
1857		*Hanbury, Daniel	Plough Court, Lombard Street
1852		Harvey, Edward	6, Giltspur Street
1853		Harris, Daniel R.	55, St. James's Street
1855		Haselden, Adolphus F.	18, Conduit Street
1843		Hemingway, Walter	20, Portman Street
1842		Henly, John C.	213, Upper Thames Street
1853		Henty, Henry M.	87, High Street, St. John's Wood
1841		Herring, Thomas	40, Aldersgate Street
1841		Herring, William	40, Aldersgate Street
1841		Herring, Edward	Trinity Square, Southwark
1843		Hewitt, John	1, Wellclose Street, Wellclose Square
1842		Hewlett, Charles J.	Cree Church Lane
1852		Hickley, Thomas P.	125, Edgware Road
1853		Hillgenberg, Henry	38, Houndsditch
1842		Hill, Arthur S.	11, Little Britain
1853		Hill, Arthur B.	11, Little Britain
1848		Hills, Thomas H.	338, Oxford Street
1852		Hockin, John B.	38, Duke Street, Manchester Square
1848		Hodgkinson, Henry	3, Newland Terrace, Kensington
1852		Hogg, Robert	9, Albion Place, Hyde Park Square
1841		Hooper, William	24, Great Russell St., Covent Garden
1842		Hooper, William	7, Pall Mall East
1841		Hooper, Bartlett	43, King William Street, City
1841		Hooper, Hugh H.	22, Commerce Place, Brixton
1853		Hopkin, William K.	5, New Cavendish Street
1849		Hopkins, Thomas	34, Montague Square
1851		Hopkins, Thomas B.	Tulse Hill, Brixton
1853		Hora, Henry W.	58, Minories
1853	175	Horncastle, John	12, Stanhope Terrace
1841		Horner, Edward	20, Bucklersbury
1841		Horner, James T.	20, Bucklersbury
1859		Howden, Robert	78, Gracechurch Street
1856	412	Howell, Maurice	Peckham
1856	435	Howell, Thomas	61, North Place, Gray's Inn Road
1842		Hucklebridge, James M.	103, Upper Ebury Street
1843		Hughes, William P.	171, Hoxton Old Town
1841		Hudson, William B.	27, Haymarket
1853		Hugill, John	61, Cannon Street
1842		Humpage, Benjamin	44, Chancery Lane
1853	198	Hunt, William	Camberwell Green

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1842		Huskisson, John	12, Swinton Street
1841		*Huskisson, William	12, Swinton Street
1853		Huskisson, Henry O.	77, Swinton Street
1848		Huxtable, John	104, St. John Street Road
1848		Huxtable, William	104, St. John Street Road
1853		Ingram, Robert	2, Queen's Terrace, St. John's Wood
1841		Jackson, John	47, Southampton Row
1853		Jamieson, John	49, Davies Street, Berkley Square
1855	298	Jefferson, Ebenezer W.	3, Southgate Road, De Beauvoir Town
1849		Jeynes, Edward	49, Gt. James Street, Lisson Grove
1845		Jeynes, George W.	42, Princess Street, Edgware Road
1853		Jobson, Thomas C.	4, John's Row, St. Luke's
1853		Jolley, George	13, Curzon Street, Mayfair
1842		Jones, Peter	11, Norton Folgate
1849		Jones, Henry S.	Fulham Road
1841		Keating, Thomas	79, St. Paul's Churchyard
1842		Kemp, Robert	2, Queen's Place, Holloway
1842		Kemp, Richard	Upper Street, Islington
1841		Kent, Thomas	226, Blackfriars Road
1848		*Kernot, George	2, Chrisp Street, Poplar
1852	81	Kershaw, George	113, Park Street, Camden Town
1853		Kettle, Joseph	42, Castle Street East
1853		King, Robert	21, Princes Street, Hanover Square
1853		King, Charles T.	86, Snow Hill
1855	309	Kingdon, William Y.	6, Devonshire Terrace, Notting Hill
1853		Lacy, Benjamin W.	13, Westbourne Grove
1842		*Langton, Frederick C. R.	226, Upper Thames Street
1850		Large, John H.	2, Holt's Place, New North Road
1853		Laugher, Charles H.	Camden Town
1853		Lavers, Richard H.	28, Old Street Road
1856		Lawrence, Frederick	8, New Chapel Street, Kentish Town
1857	429	Lawrence, Henry	49, High Street, Kensington
1841		Lescher, Joseph S.	60, Bartholomew Close
1842		Lessey, John	97, High Street, Marylebone
1853		Lidwell, Joshua E.	46, High Street, Notting Hill
1853	260	Long, George	114, High Holborn
1853		Lovell, Frederick G.	37, Newington Crescent
1853		Lowe, William E.	8, Stafford Street, Bond Street
1841		*Luckombe, Charles	86, Snow Hill
1841		*Macmurdo, Edward	100, Upper Thames Street
1842		McCulloch, William	95, Bishopsgate Street
1849		McCulloch, Charles	Covent Garden.
1853		McDougall, William	174, Regent Street
1849		Maitland, Alexander	8, Torrington Place, Torrington Sq.
1841		Maitland, John	10, Chester Place, Hyde Park
1853		Mansell, William	Plough Court, Lombard Street
1853		Marris, Joseph	37, Berners Street
1853		Marshall Thomas	2, Clayland's Place, Clapham Road
1853		Mason, John W.	136, Upper Marylebone Street
1853		Matland, George	10, Nassau Place, Commercial Road
1842		May, John	Battersea
1857		*Medlock, Henry	20, Great Marlborough Street
1842		Meggeson, George	61, Cannon Street
1853		Merrell, James	1, Queen's Terrace, Camden Villas
1858	485	*Michell, Frederic	Hampstead

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1855		Mitchell, John	12, Well's Row, Islington
1842		Moody, James	24, Church Street, Camberwell
1846		Moore, James L.	1, Craven Street, Westbourne Terrace
1853		Morson, Thomas	19, Southampton Row
1841		*Morson, Thomas N. R.	Queen Square, Bloomsbury
1841		Moscrop, Edward H.	164a, Strand
1855		Mould, Samuel	21, Moorgate Street
1859	217	Mousell, Thomas	1, Berkeley Place, Connaught Terrace
1855	218	Mumford, George	5, Bathurst Street, Hyde Park
1853		Nicholls, John	1, Union Place, New Kent Road
1853		Northway, John	27, Great Tower Street
1842		Oakley, George W.	35, Lamb Street, Spitalfields
1853		Ogle, William H.	Battersea
1855		Oldfield, Henry	3, Radcliff Terrace, Goswell Road
1841		Orridge, Benjamin B.	30, Bucklersbury
1853		Palmer, Robert	33, Wilton Place, Belgrave Square
1853		*Parnell, George William	3, Artichoke Place, Mile End Road
1842		Pasmore, James	5, Colville Terrace, Chelsea
1853		Pattison, George	126, St. John Street Road
1853		Peacock, Hamerton R.	170, High Street, Poplar
1841		Pedler, George S.	199, Fleet Street
1852		*Penrose, Arthur Wellesley	7, Amwell Street, Clerkenwell
1853		Pepper, John	1, Bedford Street, Bedford Square
1843		Peppin, Sydenham H.	25, Princes Street, Leicester Square
1859	538	Pettifer, Edmund Henry	6, Southgate Road
1854		Phillips, John	3, Vernon Place, Bagnigge Wells Rd.
1842		Philpot, Henry	32, Praed Street, Paddington
1843		Plummer, George	High Street, Peckham
1841		Pollock, Thomas	129, Fenchurch Street
1841		Portello, William	91, Charlwood Street, South Belgravia
1842		Potts, Robert U.	55, South Audley Street
1853		Power, John Henry	Denmark Hill
1846		Pratt, Edmund	1, Bloomsbury Square
1842		Preston, Joseph T.	94, Smithfield Bars
1852		Preston, Stanton W.	94, Smithfield Bars
1855	68	Quiller, Charles R.	15, Sloane Square
1859	397	Radermacher, Charles J.	2, New Cavendish Street
1841		Rawle, William	40, Cumberland Street
1841		Rea, Edward	115, Wardour Street
1853		Readman, Henry	18, Mortimer Street, Cavendish Sq.
1841		Redwood, Theophilus	19, Montague Street, Russell Square
1856		Reynolds, James John	15, Hanover Street
1854		Richards, James	40, New Bridge Street, Blackfriars
1845		Richardson, George	12, Norland Place, Notting Hill
1848		Ridsdale, James	1, Wakefield Terrace, Caledonian Rd.
1843		Roach, Pope	8, St. James's Street
1841		Rouse, Benjamin R. C.	9, Wellington Street, Southwark
1842		Rouse, Frederick J.	Clapham
1841		Rouse, Robert	1, Wigmore Street
1857	328	Rowntree, Thomas	2, Arundel Place, Islington
1859	415	Rowson, Henry	18, Chichester Street
1848		Sadler, William C.	13, Norton Folgate
1841		Sainsbury, Samuel	177, Strand
1843		Sandford, George W.	47, Piccadilly

Year of Membership.	No. of Certificate	NAME.	ADDRESS.
1853		Saxeby, William S.	11, Tothill Street, Westminster
1853		Schacht, William	38, Houndsditch
1843		*Sharpe, George Young	6, Kensington Terrace
1842		Sharwood, James Allan	98, Fenchurch Street
1841		*Shirley, John George	1, Westbourne Grove, Bayswater
1852		Simmons, Joseph	38, Lambeth Walk
1851	89	Sims, John F.	8, Hemingford Place, Barnsbury
1854		Skidmore, John	3, Charles St. West, Westbourne Ter.
1842		Slipper, James	86, Leather Lane
1847		Smith, William F.	12, Keen's Row, Walworth
1854		Snell, Glanville A.	3, Hampton Terrace, Hampstead Rd.
1842		Snelling, Francis	23, Farringdon Street
1843		Solly, Stephen F.	St. George's Circus, Southwark
1842		Southwood, Thomas S.	Harrow Road
1841		*Squire, Peter	277, Oxford Street
1841		Squire, William	95, Bishopsgate Street
1841		Starkie, James	4, Strand
1858	147	Stathers, John	43, Norland Road, Notting Hill
1849		Stead, John M.	213, Upper Thames Street
1842		Steer, Philip R.	Church Street, Hackney
1854	97	Stocken, James	112, Drummond Street, Euston Sq.
1850		Stuart, John E.	172, New Bond Street
1853		Summers, James R.	43, Curtain Road
1841		Swire, Roger	14, Edgware Road
1854		Swire, George	Brixton Hill
1854		Taylor, John	77, Hackney Road
1853		Thomas, Henry	7, Upper St. Martin's Lane
1851		Thomas, Richard W.	10, Pall Mall
1855		Thomas, John Jabez	Stoke Newington
1845		Thompson, Henry A.	86, Chiswell Street
1857	372	Tibbs, Frederick	47, Blackfriars Road
1841		Tippett, Benjamin M.	3, Sloane Street
1841		Tonge, George	213, Upper Thames Street
1842		Towerzey, Alfred	20, Marylebone Street
1857	61	Trask, Thomas	14, Albany Street
1853		Tupholme, John T.	38, Lamb's Conduit Street
1859	222	Turner, Charles E.	63, Great Russell Street, Bloomsbury
1853		Turner, Richard	2, Oxendon Street, Haymarket
1853		Tustin, Thomas H.	London Hospital
1842		Twinberrow, William	2, Edward Street, Portman Square
1852	90	Urwick, William W.	33, Denbigh Place, Pimlico
1853		Vint, James	3, High Street, Bow
1857	357	*Vizer, Edwin B.	63, Lupus Street, Pimlico
1841		*Wagstaff, John Henry	James Street, Westbourne Terrace
1842		Walker, Alexander	10, Ireland Row, Mile End
1842		*Walker, Henry	35, Skinner Street, Somers Town
1844		Waller, Arthur	6, Middleton Square
1845		Ward, Francis	14, Grosvenor Street
1846		*Warner, Charles Heath	55, Fore Street
1844		Watts, William	3, Gray's Place, Brompton
1853		Watts, William M.	32, Whitecross Street
1853		Watts, Peter	6, Sol's Row, Hampstead Road
1856	110	Watts, Henry T.	11, Victoria Road, Pimlico

Year of Membership.	No. of Certificate.	NAME.	ADDRESS.
1841		Waugh, George	177, Regent Street
1853		Wegg, William	10, North Place, Ball's Pond
1842		Westwood, William H.	16, Newgate Street
1842		Westwood, Robert	16, Newgate Street
1854	321	Wheeler, Christopher	56, Hackney Road
1841		White, John	228, Piccadilly
1841		White, Daniel	19, Park Terrace, Regent's Park
1852		White, Edmund	19, Park Terrace, Regent's Park
1853		*Whitburn Augustus R.	174, Regent Street
1853		Wilbe, Salmon	33, College Street, Chelsea
1842		Wilkes, George	1, Hayfield Place, Mile End
1853		Wilkinson, William	114, Lambeth Walk
1851		Williams, John	5, New Cavendish Street
1857	363	Williams, Thomas	2, Hereford Terrace, Bayswater
1844		Willmott, William	83, High Street, Southwark
1857		Willows, John	101, High Holborn
1853		Wilson, Thomas	Upper Holloway
1853		Windle, William	48, Portman Place
1842		Wooldridge, John	19, Bath Place, New Road
1855	364	*Wrangham, John	3, Acre Lane, Brixton
1859		Wright, George Henry	7, Poultry
1853		Wright, William V.	11, Old Fish Street
1853		Wright, John...	60, George Street, Portman Square
1842		Wyman, John	122, Fore Street
1858	294	Yarde, Giles	28, Lamb's Conduit Street
1842		Yates, Benjamin	25, Budge Row, Cannon Street
1852		Young, Frederick	137, Minories
1853		Young, George	12, Ebenezer Terrace, Mill Wall
1859		Young, William Herbert	35, Baker Street

COUNTRY MEMBERS.

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1846		Abbott, John Thomas	Darlington
1853		Abraham, John	Liverpool
1852		Ackerman, Theophilus	Bristol
1845		Ackrill, George	Abergavenny
1847		Acton, George	Worcester
1853		Adams, John	Loughborough
1853		Adams, Jonathan Henry	Stoke-on-Trent
1853		Adkins, Henry James	Birmingham
1849		Ainslie, William	Edinburgh
1852		Aitken, William	Edinburgh
1849		Albright, Henry	Liverpool
1853		Alderton, John	Hastings
1853		Aldridge, Alexander John	Brighton
1852		Alexander, James	Greenock
1848		Allanson, Charles	Harrogate
1847		Allen, Thompson	Boston
1853		Allen, Adam U.	Lymington
1853		Alpass, Horace S.	Liverpool
1846		Althorp, James	Stamford
1842		Amoore, Charles	Hastings
1858	400	Amos, Daniel	Canterbury
1852		Anderson, James	Musselburgh
1853		Anderson, Charles Thomas	Jersey
1841		Anderson, Duncan S.	Edinburgh
1853		Andrew, William	Aberdeen
1841		Andrews, John Betts	Clare
1853		Andrews, Thomas William Cox	Norwich
1854	375	*Anness, Samuel Richard	Ipswich
1841		Anthony, Jacob	Bedford
1853		Appleby, William H.	Stockport
1853		Archer, Thomas	Southam
1841		Argles, Henry	Maidstone
1858	268	Argles, John	Maidstone
1841		Armstrong, Henry	Preston
1853		Arnold, Adolphus	Guernsey
1841		Arnold, Edward	Norwich
1842		Arthy, Joseph	Peterborough
1853		Ascough, Jesse	Wolverhampton
1853		Ash, James Freer	Wiveliscombe
1853		Ashton, John Swan	Leicester
1853		Ashton, William	Southport
1853		Aslin, John	Sunderland
1846		Asling, Brelsford	Spalding
1855		Astley, John	Coventry
1859	457	*Atherton, John Henry	Nottingham
1846		Atkins, Francis Thomas	Woolwich
1842		Atkins, Francis Thomas	Deptford
1853		Atkins, Samuel Ralph	Salisbury
1853		Atkinson, Richard Marshall	Leeds
1842		*Atkinson, Stephen	Doncaster
1855	420	*Atkinson, Matthew	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Attwood, George	Brompton
1850		Aubin, James	Jersey
1853		Backhouse, William	Leeds
1844		Badcock, John	Barnard Castle
1852		Baildon, William	Edinburgh
1841		Baildon, Henry C.	Edinburgh
1853		Bailey, Richard	Penrith
1841		Bailey, William	Wolverhampton
1858	431	Bailey, Richard	Winchester
1845		Baines, Richard	Blackburn
1841		Baker, William	Chelmsford
1850		Baker, Charles Patrick	Chelmsford
1852		Baker, William	Brentford
1842		Baker, William	Retford
1855	391	*Balkwill, Frederick Pryor	Plymouth
1844		Ball, George Vincent	Banbury
1841		Ball, Joseph	Liverpool
1842		Ballard, William	Abingdon
1842		Ballard, Edwin	Farringdon
1850		Balls, George	Deptford
1845		Bally, Edward F.	Baldock
1841		Baly, Henry	Warwick
1848	12	Bancroft, John James	Ruthin
1859		Banfield, Harold	Bury St. Edmunds
1841		Banks, Morris	Birmingham
1853		Barber, George	Liverpool
1845		Barclay, John	Falmouth
1842		Barker, William Henry	Biggleswade
1853		Barker, Joseph	Sudbury
1846		Barling, Thomas	Weymouth
1853		Barlow, Samuel	Darlington
1841		Barnes, James	Preston
1850		Barnett, William	Brighton
1853		Barnish, Edwin H.	Wigan
1853		Barritt, George	Croydon
1849		Barron, William	Cheltenham
1842		Barry, George	Northampton
1853		Barry, Edwin	Northampton
1853		Barry, James	Northampton
1853		Barstow, Charles H.	Spofforth
1847		Barton, Henry	Brighton
1853		Barton, Charles	Brighton
1852		Barton, William	Campbeltown
1842		Bass, William Thomas	Enfield
1846		Bassett, Charles	Pontypridd
1853		Batchelor, Charles	Fareham
1853		Bateman, John Bird	Manchester
1852		Bates, John	Bicester
1853		Bath, Richard C.	Morice Town
1842		Battle, John Richard	Lincoln
1841		Baumborough, William	Wandsworth
1855	207	Baxter, William Walmisley	Bromley
1841		Baynes, James	Hull

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1858		Baylis, Thomas	Worcester
1841		Beach, Thomas	Bridport
1847		Beadon, John	Taunton
1852		Beard, James	Manchester
1842		Beardsley, John	Nottingham
1853		Beaumont, William H.	Gravesend
1847		Beckett, John	Scarborough
1846		Beech, Joseph	Atherstone
1841		Beesley, Henry	Banbury
1844		Beesley, Thomas	Banbury
1841		Bell, William D.	Leeds
1851		Bell, William	Carlisle
1853		Bell, Edward C.	Dudley
1857	280	Bell, James	Manchester
1857		Bell, Francis	Bradford
1841		Bennet, William	Bath
1842		Bennett, George	Newark
1850		Bennett, John W.	Leigh, Lancashire
1853		Bentham, Thomas	Southsea
1853		Berry, Henry James	Worthing
1853		Bettison, Joseph	Chesterfield
1854	365	Betts, George William	Spalding
1853		Betts, John	Woodbridge
1847		Bevan, Charles F.	Harwich
1853		Bew, Robert	Bilston
1842		Biggs, Robert	Bath
1852		Bingley, Thomas Gyles	Manchester
1853		Binns, Samuel	Sheffield
1848		Binsley, James	Edinburgh
1842		Birch, Thomas Edwards	Mold
1850		Bird, Ash Rudd	Ipswich
1842		Bird, Alfred	Birmingham
1842		Bird, Charles	Worcester
1841		Bishop, Robert	Eye
1849		Bishop, Thomas	Woolwich
1853		Black, James	Leven
1852		Blacklock, Henry	Bournemouth
1841		Blacklock, Joseph D.	Brighton
1842		Blackburn, Bailey	Bradford
1842		Blades, Christopher	Leek
1846		Blades, Holland	Nantwich
1842		Blades, Sherriff	Northwich
1845		Blackshaw, Thomas	Burslem
1856		Blake, William F.	Stroud
1853		Blamires, Samuel	Bradford
1852		Blanshard, George	Edinburgh
1853		Blanshard, Thomas	Edinburgh
1857		Bland, John Handel	Stourbridge
1848		Bloor, Joseph	Derby
1853		Blunt, Thomas	Shrewsbury
1842		Boast, Thomas	York
1842		Bolton, Thomas	Tenterden
1853		Bond, Laurence V.	Tiverton
1842		Bond, John	Great Yarmouth

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1850		Bond, Charles	Leamington
1842		Bond, John	Minehead
1848		Boocock, John	Leeds
1852	116	Boorne, Charles	Bristol
1853		Booth, James	Blackburn
1853		Booth, Thomas Buckley	Eccles
1842		Booth, John	Heckmondwicke
1853		Booth, Aaron	Manchester
1841		Booth, James	Rochdale
1858	499	*Booth, Henry	Rochdale
1853		Booth, Nathaniel	Rotherham
1859	332	Borland, John	Kilmarnock
1853		Bostock, William	Ashton-under-Lyne
1855	304	Botham, William	Manchester
1842		Bottle, Alexander	Dover
1849		Bowen, Henry F.	Rottingdean
1843		Bowers, Thomas	Chester
1847		Bowers, James D.	Chester
1841		Bowerbank, Joseph	Cockermouth
1853		Bowerbank, Fawcett	Cockermouth
1853		Bowker, James	Manchester
1853		Bowles, Charles A.	Chester
1858		Bowman, William	York
1853	257	*Boyce, John Pierce	Windsor
1841		Boyce, John Pierce	Chertsey
1842		Braddock, William	Oldham
1856	411	*Brady, Henry B.	Newcastle-on-Tyne
1853		Bragg, William B.	Market Harborough
1842		Brailey, Charles	Heavitree
1849		Bramwell, George	Liverpool
1853		Brandreth, John	Preston
1853		Brandreth, Lawrence	Preston
1842		Brayshay, William Bolam	Stockton
1842		Brearey, William A.	Douglas
1846		Bremner, William	Thurso
1845		Brend, Thomas	Swansea
1852		Brereton, John	Manchester
1858	272	Breton, Walter	Brighton
1858	428	*Brevitt, William Y.	Wolverhampton
1842		Brew, Thomas Archer	Brighton
1842		Brewster, William	Cambridge
1853		Brierley Richard	Stalybridge
1842		Briggs, James	Tipton
1843		Bright, Philip	Brecon
1853		Bright, William	Bath
1850		Brimelow, Thomas	Farnworth
1853		Bromfield, William	Crewe
1853		Bromfield, Charles	Exeter
1848		Bromley, Charles	Liverpool
1853		Brothers, William	Folkestone
1842		Brown, Charles	Belper
1853		Brown, Thomas Dudley	Coventry
1846		Brown, William	Dunfermline
1844		Brown, John	Eccles

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1852	121	Brown, David R.	Edinburgh
1853		Brown, Thomson	Glasgow
1853		Brown, Alfred James	Halstead
1850		Brown, Thomas	Lutterworth
1845		Brown, William Scott	Manchester
1853		Brown, George	Selby
1853		Brown, Samuel	Spilsby
1853		Brown, Thomas	Tyldesley
1847		Bryant, William	Huntingdon
1853	226	Bryce, James	Dunfermline
1853		Buck, Richard C.	Dudley
1853		Bullus, William	West Bromwich
1853		Bunn, Charles	Leiston
1842		Burdon, John	Durham
1848		Burdwood, James	Plymouth
1851		Burgess, William	Northwich
1853		Burnett, Robert	Frazerburgh
1853		Burns, James Adam	Stirling
1853		Burrell, George	Montrose
1852		Burrow, Walter B.	Great Malvern
1853		Burrow, John Severn	Great Malvern
1853		Bustin, William	Shotley Bridge
1852		Butcher, Thomas	Cheltenham
1841		Butler, Samuel	Bristol
1841		Butler, William	Wycombe
1853		Butler, Thomas E.	Leicester
1856	379	Butler, John S.	Liverpool
1841		Butterfield, James M.	York
1853		Butterworth, Isaac	Ashton-under-Lyne
1849		Bwye, George	Cheshunt
1853		Caddick, John	Newcastle-under-Lyne
1853		Caley, Albert Jarman	Norwich
1849		Calvert, Robert	Stokesley
1842		Calvert, James	Belper
1846		Campbell, Donald	Glasgow
1853		Campbell, Edward D.	Sunderland
1852	122	Carmichael, Lauchlan	Edinburgh
1842		Carr, William	Leicester
1841		Carr, William Graham	Berwick
1844		*Carran, Thomas	Peel, Isle of Man
1853		Carruthers, Richard Birrell	Dumfries
1844		Cartwright, William	Newcastle-under-Lyne
1850		Carter, William	Manchester
1852		Cattle, James	Liverpool
1853		Chamberlin, William	Leicester
1842		Chantry, George	Goole
1855	62	Chaplin, John Lambert	Colchester
1846		Chaplin, Alfred	Brighton
1849		Chapman, Richard J.	Chipping Ongar
1853		Chapman, Henry	Clifton
1841		Chapman, John Cook	Congleton
1842		Chapman, Edward	Hull
1853		Chapman, William Fox	Hull
1853		Chapman, William	Ipswich

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Chapman, Henry	Ipswich
1853		Chapman, John	Tring
1853		Chapman, William	York
1841		Chater, Jonathan	Watford
1853		Chaundy, Thomas G.	Oxford
1842		Chave, John Anstey	Uxbridge
1856	178	Chenery, William H.	Ipswich
1853		Childs, James L.	Southsea
1842		Chipperfield, Robert	Southampton
1859	487	*Chrispin, William	Ripon
1851		Christian, Francis	Birmingham
1842		Christopher, William	Crickhowell
1853		Churchill, John	Birmingham
1856		Churchouse, William B.	Chard
1855	334	Clark, William W.	Dorking
1853		Clark, Robert	Devizes
1853		Clarke, Benjamin Joseph	Cheltenham
1847		Clarke, William	Durham
1845		Clarke, John Webster	Leicester
1853		Clarke, William	Longsight
1846		Clarke, Thomas Meadows	Richmond
1856		Clarke, Thomas	Somerton
1841		Clarke, Joseph	York
1853		Clater, Francis	Retford
1841		Clay, Robert	Liverpool
1854	201	Clayton, John Oates	Leeds
1853		Clennell, John Morton	Newcastle-on-Tyne
1853		Clift, Joseph	Dorking
1849		Clift, Edward	Lewisham
1845		*Coates, William	Snaith
1858		Coates, John M.	Newcastle
1853	123	Cobb, John S.	Yarmouth
1852		Cochrane, Thomas	Falkirk
1853		Cock, John	Shipdham
1842		Cocking, George	Ludlow
1853		Cockton, John	Maryport
1841		Colbeck, George Royde	Leamington
1848		Cole, Walter Thomas	Weymouth
1841		Coleman, James	Cardiff
1859		Collier, William Lindsey	Reading
1853		Collier, William	Sheffield
1846		Collier, William	York
1849		Collings, William Henry	Bristol
1852		Colton, Thomas	Selby
1853		Commans, Robert Dyer	Bath
1853	185	Conacher, David	Markinch
1853		Constable, Edwin	Birkenhead
1842		Conway, William	Pontypool
1847		Cooling, John	Newark
1843		Cocke, William	Norwich
1845		Cooper, Mark Ward	Bridlington
1850		Cooper, George Brown	Brightlingsea
1852		Cooper, James Robert	Birmingham
1841		Cooper, James Newbury	Clifton

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Cooper, George	Exeter
1841		Cooper, Thomas	Leicester
1853		Cooper, Lewis	Reading
1845		Cooper, Thomas	York
1853		Corfield, Thomas J. T.	St. Day
1843		Cornelius, Richard Bussell	Teignmouth
1845		Cornish, Henry Robert	Penzance
1843		Cornish, William	Brighton
1841		Corrie, Charles	Bedford
1841		Cortis, Charles	Worthing
1853		Cottee, William	Salford
1853		Cotterell, William Henry	Dover
1841		Cotton, Gilbert Knill	Barnstaple
1853		Coupland, Henry	Liverpool
1853		Coupland, Joseph	Harrogate
1842		Cousins, Thomas George	Oxford
1842		Coverley, John	Scarborough
1845		Cowell, Silas	Canterbury
1845		Cowgill, Brian Y.	Burnley
1841		Crafton, Ralph Caldwell	Croydon
1853		Crarer, John	Blairgourie
1842		Craske, Samuel	Holt
1853		Crick, George Edward	Maldon
1853		Cripps, John	Hammersmith
1842		Critchley, John	Blackburn
1842		Crocker, Henry Radcliffe	Brighton
1853		Crofts, Holmes Cheney	Chatham
1852	124	Croley, William	Edinburgh
1842		Cronshey, James	Thetford
1841		Crook, George	Farnham
1841		Cropper, James	Long Sutton
1858	432	*Cross, William	Cardiff
1847		Cross, William Gower	Shrewsbury
1853		Croskell, Charles	York
1853		Crowder, Charles H.	Barton-on-Humber
1846		Crowther, Thomas	Tickhill
1851		Cuff, Robert C.	Bristol
1852		Cumbers, John	Wandsworth
1853		Cumine, Frederick H.	Southport
1841		Cupiss, Francis	Diss
1853		Currie, John	Glasgow
1854	273	Cuthbert, John Mason	Bedford
1842		Cutting, James Bray	Leamington
1848		Cutting, Thomas	Selby
1853		Cutts, Thomas	Basford
1842		Dale, George	Chichester
1844		Dale, William James	Portsea
1855		Dance, William D.	Stourport
1853		Dandie, David	Perth
1855	126	Dandie, Robert	Perth
1850		Davenport, Edward	St. Alban's
1846		Davidson, John	Berwick
1853		Davidson, Charles	Aberdeen

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Davies, Richard Morgan	Carmarthen
1853		Davies, Thomas	Cheltenham
1853		Davies, John L.	Hay
1853		Davies, Peter Hughes	March
1853		Davies, William Henry	Pillgwinlly
1841		Davis, John	Dorchester
1841		Davis, Robert	Dorchester
1845		Davis, John Oliver	Folkestone
1859	282	Davis, Richard Hayton	Harrogate
1856		Davis, D. Frederick	Leominster
1841		Davis, Henry	Leamington
1842		Davis, Francis	Newbury
1848		Davis, John Oliver, jun.	St. Leonards
1845		Davison, Ralph	York
1842		Davy, Henry	Wiveliscombe
1854		Dawe, Sampson	Monmouth
1841		Dawe, Sampson R.	Swansea
1853		Dawson, Thomas	Preston
1853		Day, George	Blackheath
1852		Deacon, George F.	Beccles
1853		Dearlove, Thomas B.	Brackley
1845		Death, John William	Brompton
1853		De Bois, Frederick	Glasgow
1853		De Carle, Joseph Parkinson	Modbury
1853	194	Deck, Arthur	Cambridge
1845		Dennison, Matthew	Dudley
1853		Densham, John B.	Plymouth
1852		Dewar, Peter James	Dingwall
1842		Dexter, James	Eastbourne
1842		Dickerson, Henry	Devonport
1845		Dickins, Rowland	Aylesbury
1847		Dingley, Richard Loxley	Evesham
1853		Dixon, Benjamin	Norwich
1858	460	Dixon, Henry	Ryde, Isle of Wight
1854	381	*Dixon, William	Southampton
1842		Dobinson, William	Sunderland
1853		Dobson, James	Keswick
1858		Dobson, John	Newcastle-on-Tyne
1847		Dodman, Robert	Thorney
1842		Dodshon, Edward	Sunderland
1852		Done, John	Manchester
1850		Dores, James	Alnwick
1846		Doubell, James	Rayleigh
1855		Doughty, Richard	Bushey
1842		Dowell, William Cuming	Bristol
1845		Dowman, George	Southampton
1847		Down, Richard Haydon	Torpoint
1853		Downes, Joseph	Romford
1847		Downing, Joseph	Braintree
1852		Dowthwaite, William	Barnet
1841		Drage, William F.	Birmingham
1841		Dresser, Richard	York
1853		Drew, John	Pershore

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Dron, William	Kirkcaldy
1841		Duck, Daniel	Guisborough
1846		Dudden, Richard M.	Midsomer Norton
1852		*Dudgeon, George	Nottingham
1842		Duggan, Henry	Hereford
1853	184	Duncan, William	Rothesay
1841		Duncan, John	Edinburgh
1842		Duncan, Frederick MacRae	Sandwich
1842		Dunhill, William	Doncaster
1853		Duprey, Jean A. B.	Jersey
1853		Durant, Frederick	Dorking
1853		Durant, Edmund	Dorking
1847		Dutton, John	Birkenhead
1842		Dutton, George	Bolton
1853		Dyer, John	Margate
1842		Dyer, Thomas	Exeter
1853		Dyer, William	Halifax
1842		Dykes, Thomas	Worcester
1842		Dyson, John	Andover
1853		Eastes, Thomas Henley	Dover
1853		Edgar, James	Henley-on-Thames
1853		Edmonds, Benjamin M.	Lowestoft
1853		Edmonson, John	Preston
1842		Edwards, George	Dartford
1853		Edwards, William	Denbigh
1853		Edwards, James	Leicester
1850		Edwards, Henry	Lincoln
1848	22	*Edwards, John Baker	Liverpool
1853		Edwards, William	Sidmouth
1853		Ekins, William	Huntingdon
1842		Eliott, Samuel	Liskeard
1842		Ellaby, John	Melton Mowbray
1842		Ellis, Benjamin	Shepton Mallett
1853		Ellis, William	Abergele
1849		Ellis, Richard	Thornbury
1841		Ellison, John	Liverpool
1859		Ellwood, William	Dublin
1845		Elsey, John	Horncastle
1856	258	*Elsey, Charles	Market Rasen
1847		Ely, George	Bingham
1843		*England, William Paul	Huddersfield
1848		Ereaut, John	Jersey
1853		Ereaut, George	Jersey
1858	211	Evans, Evan	Aberavon
1847		Evans, Thomas	Aberdare
1853		Evans, Samuel	Caerphilly
1853		Evans, William Luke	Cardiff
1842		Evans, John	Hemel Hempstead
1851	43	Evans, Thomas	Liverpool
1842		Evans, Edward	Liverpool
1854	47	Evans, Henry S.	Liverpool
1842		Evans, Thomas B.	Liverpool
1853		Evans, John	Narberth

Year of Membership.	No. of Certificate.	NAME	RESIDENCE.
1853		Evans, William Downing	Newport, Monmouth
1842		Eyre, Alfred B.	Ipswich
1842		Eyre, Thomas S.	Launceston
1844		Fairbank, James Hack	Woolwich
1853	361	Fairbarn, George	Liverpool
1853		Fairley, Thomas	Sunderland
1841		Fairweather, John	Newcastle
1853		Falkner, Richard	Banbury
1853		Farie, Gilbert	Bridge of Allan
1842		Farmer, John	Putney
1847	26	Farmer, James	Castle Donington
1853		Farnworth, William	Blackburn
1853		Farrage, Robert	Rothbury
1850		Farrant, Henry	Ottery St. Mary
1842		Farrant, Robert	Salisbury
1843		Farrant, John G.	Brentford
1854	99	Farrer, John Daniel	Chester
1853		Farrow, William	Woburn
1842		Fergusson, John	Liverpool
1842		Fielder, Thomas	Warminster
1842		Finch, John	Cheltenham
1852		Finlayson, Thomas	Leith
1854	195	Fisher, William Henry	Edinburgh
1851		Fisher, John Thornhill	Torquay
1853		*Fisher, Henry Christopher	Torquay
1853		Fiske, Charles	Ipswich
1843		Fitch, Robert	Norwich
1842		Fitt, Edward	Barking
1841		Fleeming, William	Wolverhampton
1842		Fletcher, Francis	Cheltenham
1841		Flockhart, William	Edinburgh
1853		Flower, Thomas S.	Matlock-Bath
1842		Foggitt, Thomas Jackson	Thirsk
1841		Forbes, William	Reigate
1853		*Forge, Christopher	Bridlington
1853		Forman, George	Birmingham
1853		Forrest, Richard William	Gainsborough
1853		Forster, John	Whitehaven
1853		Forster, John	Sunderland
1845		Forster, Robert	Dover
1853		Forsyth, William	Aberdeen
1841		Foster, Frederick	Brighton
1853		Foster, Alfred Hood	Birmingham
1841		Foster, Joseph	Collumpton
1845		Foster, James Fawcett	Hull
1842		Foster, Edward	Ludlow
1855		Foster, George Pitt	Tetbury
1853		Foster, John	Uckfield
1842		Foulds, William	Chowbent
1846		Fowke, George	Stafford
1853		Fowler, Edward	Bedale
1853		Fowler, Henry	Torrington
1849		Fox, Charles James	Witney

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Foxcroft, Elijah	Skipton
1842		Francis, George	Great Baddow
1853		Franks, Alfred	Ramsgate
1853		Fraser, Charles	Largs
1853		Frazer, Daniel	Glasgow
1853		Freeland, John	Barrhead
1844		Freestone, Thomas Morris	Bristol
1841		French, Gabriel	Chatham
1849	3	French, Joseph B.	Williamstown, Victoria
1853		Fresson, Lewis Francis	Stevenage
1851		Frost, William Henry	Collumpton
1841		Fryer, Henry	Huddersfield
1851		Funnell, William Henry	Brighton
1849		Furmston, Samuel C.	Ash
1853		Gall, Benjamin D.	Woodbridge
1842		*Gamble, Richard	Grantham
1853		Gammidge, Samuel	Leicester
1841		Garbutt, Cornelius	Gateshead
1853		Garbutt, Cornelius D.	Gateshead
1842		Gardener, Charles	Tunbridge Wells
1841		Gardner, James	Edinburgh
1853		Garland, William	Leeds
1846		Garlick, Thomas H.	Halifax
1853		Garlick, John	Hollinwood
1853		Garnett, Joseph	Newcastle-on-Tyne
1851		Garnham, Barrington	Brighton
1842		Garratt, John Colpman	Rugby
1856		Garratt, Samuel	Rugby
1842		Garside, Burdett F.	Southport
1842		Gay, George	Stroud
1853		Geake, John	St. Columb
1846		Geldard, John	St. Austell
1842		Geldard, Richard Kelly	Plymouth
1853		Gerrard, Joseph	Longton
1841		Gibbons, William	Plymouth
1852		Gibbs, William	Ryde
1851		Gilbert, George	Portsea
1847	37	*Giles, Richard William	Clifton
1841		Giles, Richard Bobbet	Clifton
1842		Gill, Samuel	Pendleton
1842		Gill, William	Tavistock
1853		Gillman, Thomas Rice	Newport, Monmouth
1841		Gilkes, William	Leominster
1856	433	Gissing, Thomas W.	Wakefield
1844		Glaisby, John	York
1841		Glaisyer, Thomas	Brighton
1852	71	Glanfield, George	Torquay
1853		Glasier, Samuel	Manchester
1859	458	*Glass, John T.	Cheltenham
1853		Glew, William	Selby
1850		Glover, Samuel	Liverpool
1841		Gloyne, Thomas Hadfield	Dewsbury
1858		Glyde, John William	Blandford

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1848		Goadsby, Thomas	Manchester
1842		Goddard, Joseph	Leicester
1842		Goodall, Thomas	Ensham
1850		Goodall, Henry	Derby
1841		Goode, Thomas	Congleton
1857	79	Goode, Charles	Congleton
1853		Goodrich, George	Dursley
1857		*Goodwin, John	Lower Clapton
1842		Gordelier, Paul William Gibbs	Sittingbourne
1853		Gordon, John	Edinburgh
1853		Goss, Samuel	Barnstaple
1853		Gostling, Thomas P.	Diss
1853		Gould, Frederick	Kingston-on-Thames
1855		Govan, Alexander	St. Andrews
1841		Gow, Alexander	Wolverhampton
1857		Granger, Edwin John	Upper Clapton
1852	130	Gray, Alexander F.	Edinburgh
1852	131	Gray, John	Cupar Angus
1848		Gray, William	Rothwell
1853		Gray, Charles	Bilston
1853		Greaves, Abraham	Ironville
1844		Greaves, John	Bakewell
1842		Greaves, Richard	Ripon
1853		Green, Robert Poynton	Witham
1853		Green, George	Selby
1848		Green, John	Birkenhead
1853		Green, William M.	Liverpool
1842		Green, William	Bath
1854	245	Green, James	Droitwich
1853		Greenough, George	Manchester
1849		Greenwell, William C.	Gateshead
1848		Greenwood, John	Harrogate
1853		Gregory, Edward James	Cheltenham
1853		Greig, William	Glasgow
1852		Griffith, Robert	Carnarvon
1844		Griffith, Charles	Weston-super-Mare
1846		Griffith, Richard	Slough
1853		Griffiths, John	Manchester
1853		Griffiths, John	Narberth
1853		Griffiths, William	Swansea
1855	18	*Grindley, Robert D.	Chester
1853		Groom, William Bishop	Liverpool
1852		Grounds, George Field	Bishop Stortford
1842		Grounds, Ambrose	Ludlow
1854	95	Groves, Wellington E.	Blandford
1853	103	Groves, Thomas Bennett	Weymouth
1853		Groves, Edward	Hammersmith
1852		Grundy, Edwin	Lenton
1853		Gudgen, George B.	Kimbolton
1842		Gulliver, Walker Job	Lutterworth
1842		Gundry, William	Bristol
1842		Gunner, George	Winchester
1841		Gurnell, Thomas	Dartford

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1846		Guy, Guy	Helstone
1841		Gwatkin, James Thomas	Brighton
1852		Gwillim, John Cole	Newport, Monmouth
1853		Hadfield, John	Congleton
1841		Hadfield, William	Congleton
1853		Hadfield, William P.	Newark
1852		Haigh, Joseph	Leeds
1842		Haines, John Jenkins	Bromsgrove
1853	182	Hains, Parton John	Highgate
1843		Hall, Joseph	Salford
1852		Hall, Thomas	Newcastle-on-Tyne
1853		Hall, Richard	Brecon
1853		Hall, Robert	Camborne
1852	4	Hall, John Richard	Canterbury
1849		Hall, Thomas	Grantham
1842		Hall, George	Huddersfield
1853		Hall, Henry R. F.	Hull
1859	536	Hallaway, John	Carlisle
1842		Hallsworth, Thomas	Manchester
1850		Ham, Charles H.	Exeter
1853		Ham, John	Nether Stowey
1841		Hambrook, Odden	Dover
1857		Hambrook, John B.	Dover
1853		Hamilton, Julius	Poole
1858		Hamilton, John T.	Dublin
1846		Hammon, Richard	Folkestone
1855	383	Handley, John	Wakefield
1853		Hannell, Edward W.	Rugby
1853	230	Hardie, James	Dundee
1853		Harding, James John	Sudbury
1853		Hardman, Thomas B.	Liverpool
1853		Hare, Josiah William	Harleston
1852		Hargreaves, Henry L.	Oldham
1842		Harold, William	Battle
1842		Harper, Henry	Leamington
1853		Harrington, Richard B.	Honiton
1852		Harrington, Arthur	Rochford
1854	203	Harris, William Harry	Northampton
1853		Harrison, Thomas	Leeds
1842		Harrison, Thomas	Bradford
1842		Harrison, James Parker	Carlisle
1847		Harrison, John	Nottingham
1842		Harsant, William	Epsom
1848		Hart, James	Bolton
1852		Hart, Hugh	Glasgow
1853		Hart, George William	Hull
1841		Hartland, James	Bristol
1853		Hartley, Robert	Manchester
1853		Hartshorn, William H.	Ironbridge
1841		Harvey, Thomas	Leeds
1843		Harvey, John	Newark
1851		Harwood, John	Putney
1842		Haselar, Albert	Cranbrook
1853		Hatrick, Robert	Paisley
1853		Hatrick, William	Paisley

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1848		Hatfull, Robert	Deptford
1842		Hattersley, John	Barton-on-Humber
1853		Hawkins, Henry Ford	Rugeley
1841		Hawxby, Thomas	Tottenham
1847		Haydon, Frederick Walter	Fordingbridge
1857	447	*Hayes, James	Great Warley, Essex
1853		Hayman, Alfred	Neath
1853		Hayward, Samuel H.	Gloucester
1845		Hayward, William G.	Reading
1845		Hayward, Edward	Ipswich
1853		Hayward, Charles	Manchester
1847		Hazell, Robert W.	Maidstone
1842		Head, John	Lewes
1842		Headley, Morris	Bridlington Quay
1846		Heald, William	Sleaford
1841		Heath, Edward	Cromer
1845		Heathcote, Thomas Sarl	Newcastle-under-Lyne
1847		Heaton, John Scholes	Manchester
1857	370	Heelas, Henry Martyn	Reading
1842		Hellowell, Daniel	Leeds
1856	231	Helmrich, William	Ayr
1853	285	Heming, Robert	Sunderland
1842		Heming, Richard George	Worcester
1848		Hempsted, Robert	St. Leonards
1853		Henderson, John	Glasgow
1853		Henley, Henry	Lyme Regis
1853		Henshall, John	Congleton
1853		Hensleigh, Henry	Plymouth
1841		Henson, Matthew	Dunstable
1853		Henthorn, Joshua	Oldham
1853		Herington, Joseph	Leighton Buzzard
1845		Hern, William Henry	St. Austell
1853		Hewett, William Henry	Great Yarmouth
1853		Hewlins, Edward	Leatherhead
1842		Hibbert, Walter	Neath
1845		Hick, Matthew Bussey	Wakefield
1846		Hick, Allan	Wath
1845		Hick, Joseph	Bradford
1842		Hickman, Joseph Frederick	Newbury
1852		Hicks, Robert	Lerwick
1853		Hicks, George	Rothesay
1853		Hifley, Richard James	Devonport
1853	96	Higgins, Thomas S.	Huddersfield
1843		Higgins, William	Chester
1842		Higgs, John Seagrave	Market Harborough
1842		Highway, Henry	Walsall
1853	192	Hill, Charles William	Burnley
1842		Hill, Richard	Bruton
1854		Hill, Thomas	Bedford
1853		Hill, William	Manchester
1853		Hill, Simon	Plymouth
1841		Hill, John	Sheffield
1853		Hinchcliffe, Ferrand G. U.	Manchester
1853		Hincks, Thomas R.	Chester
1853		Hinds, James	Coventry

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Hine, Alfred	Beaminster
1858		Hingston, Andrew H.	Liverpool
1853		Hipkins, Matthew	Birmingham
1842		Hitchcock, Charles Edmund	Colchester
1842		Hitchcock, William Richards	Taunton
1853		Hobson, Charles	Beverley
1847	1	Hodder, Henry	Bristol
1853		Hoddy, Benjamin	Halstead
1852	133	Hodgeton, David	Brechin
1841		Hodgson, Edward	Stockton
1853		Hodkinson, Henry	Macclesfield
1853		Hogg, Henry	Bristol
1853		Hogg, Thomas	Bideford
1853		Holden, Richard	York
1853		Holdsworth, Thomas W.	Birmingham
1854		Holland, William	Market Deeping
1841		Hollier, Elliott	Dudley
1843		Holt, George Palmer	Bexley Heath
1853		Holt, Richard Wylde	Seacombe
1853	13	Hooker, Thomas E.	Wellington
1842		Hooper, Henry	Brighton
1853		Hopper, Richard	Sunderland
1841		Hopwood, Henry J. S.	Richmond, Surrey
1841		Horncastle, Henry	Sheffield
1841		Horner, Stephen	Hartlepool
1845		Hornsby, John Harwood	Odiham
1857	174	Hornsby, George G.	Cheltenham
1853		Horsey, James	Portsea
1851		Houghton, James	Liverpool
1853		Houghton, Thomas	Oxford
1856		Houlton, James	Wetherby
1841		Howard, Robert	Stratford-le-Bow
1853		Howard, John Eliot	Stratford-le-Bow
1853		Howard, Richard	Tunbridge Wells
1842		Howard, John	Manchester
1842		Howman, Philip	Winchcombe
1846		Howorth, James	Doncaster
1855		Howson, Thomas J.	Gateshead
1851		Howson, Thomas B.	Oxford
1853		Hubbard, Robert W.	Kenilworth
1842		Hudson, Richard	Kendal
1851	10	Huggins, George Thomas	Barnet
1849		Hughes, Edward	Altrincham
1842		Hughes, Samuel	Stourbridge
1842		Hulbert, Robert Skeat	Basingstoke
1853		Hulme, John Hughes	Norwich
1853		Hulme, Thomas	Oldham
1842		Humphreys, Matthew	Nottingham
1842		Humphreys, Thomas	Birmingham
1842		Hunt, Henry	Wandsworth
1851		Hunt, Thomas	Luton
1855	104	*Hunt, Richard	Andover
1853	135	Hunter, David	Edinburgh
1853		Hunter, John	Gosport
1842		Huntley, John	Wimborne

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1855		Hurdon, James	Appledore
1853		Hurman, John	Bridgewater
1844		Hurst, William T. H.	Hempstead
1842		Hurst, John	Louth
1842		Husband, Matthew	Exeter
1853		Iliffe, Thomas	Nuneaton
1853		Ingham, Henry	Wellingore
1853		Ingham, Richard H	Manchester
1853	306	Isaac, George Washington	Bristol
1852		Iverach, William	Kirkwall
1854	136	Jaap, John	Glasgow
1842		Jackson, William George	Hartlepool
1841		Jackson, Thomas	Manchester
1852	105	Jackson, William	Stowmarket
1853		Jackson, Henry	Liverpool
1853		Jackson, Clay	Chesterfield
1845		Jackson, Edmund	Lancaster
1842		James, John	Truro
1853		James, John Parry	Cardiff
1853		James, Henry	Bognor
1853		Jameson, Walter C	Bath
1853		Jefferson, Peter	Leeds
1853		Jeffery, Russell	Cheltenham
1848		Jeffery, Moses Williams	Devonport
1846		Jenkins, Henry Maine	Christchurch
1853		Jenkins, John	Peterchurch
1849		Jenner, William M	Sandgate
1855	286	Jennings, John Edgell	Southampton
1841		Jennings, William	Halifax
1842		Jennings, Reginald	Hereford
1853		Jennings, John E. H.	Sheffield
1853		Jessop, Jonathan	Halifax
1852		Jobson, William	Dundee
1858	390	Johnson, George	Birmingham
1853		Johnson, Thomas	Leek
1841		Johnson, John H.	Liverpool
1853		Johnson, John B.	Uttoxeter
1841		*Johnson, Samuel	Liverpool
1853		Jones, John	Aberdare
1848		Jones, Charles	Birkenhead
1842		Jones, Edward Bowen	Carmarthen
1841		Jones, Charles	Hanley
1842		Jones, William	Hastings
1845		Jones, John	Holywell
1841		Jones, William B.	Kingston-on-Thames
1845		Jones, Samuel Urwick	Leamington
1853		Jones, Owen Lewis	Liverpool
1842		Jones, William	Liverpool
1859	465	Jones, Humphrey	Llangollen
1853		Jones, David	Narberth
1853		Jones, Thomas J.	Newport
1853		Jones, Ellis Powell	Rhyl
1848		Jones, James	Salford
1853		Jones, William Thorpe	Southwell

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1844		Jones, Oliver Ellis	Welshpool
1853		Jones, Thomas	Welshpool
1857	115	*Joy, Francis William	Cardiff
1842		Judson, Thomas	Ripon
1859	473	Judd, William	Hertford
1846		Jull, Thomas	Horsham
1853		Keall, Powell Skinner	Bristol
1845		Keeling, George Ratcliffe	Epsom
1852		Keene, Alfred	Leamington
1853		Keith, James	Aberdeen
1852	137	Kemp, David	Portobello
1841		Kemp, Grover	Brighton
1854		Kemp, John	Brighton
1848		Kemp, William	Horncastle
1841		Kendall, Frederick	Stratford-on-Avon
1844		Kendall, George	Masham
1853		Kennedy, William	Glasgow
1853		Kent, Alfred	Basingstoke
1853		Ker, Thomas Foster	Manchester
1852		Ker, Thomas	Edinburgh
1853		Kernick, Samuel Penrose	Cardiff
1843		Kernot, Joseph	Naples
1843		Kernot, Septimus	Naples
1847		Kershaw, James	Southport
1842		Kiddy, Samuel	Belper
1841		Kimbell, Henry	Knowle
1841		Kinch, Charles	Henley-on-Thames
1852		Kinder, John	Glossop
1842		King, Joseph Raymond	Bath
1853		King, William George	Market Drayton
1841		King, Thomas Simmons	Rochester
1853		King, William	Soham
1853		King, Charles Montague	Southend
1853		King, Ellis	Southend
1858	234	Kinninmont, Alexander	Glasgow
1854	276	Kirk, John	Maidstone
1853		Kirk, Charles	Hartley Row
1853		Kirk, Thomas	Liverpool
1853		Kirkbride, William	Penrith
1859	299	Kirkman, George B	Plymouth
1842		Kitching, Charles	Haverhill
1853		Knapman, John	Exeter
1854		Knight, Joseph	Bath
1842		Knight, Edward Sackville	Bridport
1858		Knight, John	Cambridge
1841		*Knott, Thomas	Exeter
1844		Knowles, Richard John	Demerara
1852		Knowles, John J	Sandwich
1853		Laen, William	Pembroke Dock
1853	187	Laird, William	Dundee
1853		Lamotte, Thomas Gallye	Bristol
1853		Lancaster, Henry	Croydon
1853		Lane, Joseph	Hampstead
1842		Langford, William	King's Lynn

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1858	100	Langman, Peter	Chatteris
1843		Lansdale, Ralph	Wycombe
1841		Large, Henry	Nottingham
1853		Lasham, John	Dedham
1841		Lathbury, Robert	Liverpool
1842		Lavers, Thomas Howard	Blackheath
1853		Law, William	Forfar
1842		Lea, Henry Clairmont	Hastings
1853		Lea, Samuel	Ellesmere
1841		Lea, John Wheeley	Worcester
1859	183	*Lea, Charles Wheeley	Worcester
1853		Leach, John	Crawley
1855		Leadbetter, William Austin	Melton Mowbray
1841		Leay, Joseph	Birmingham
1846		Leggett, John Tudway	Wareham
1853		Leighton, John H.	Durham
1852		Leith, James	Edinburgh
1853	138	Lever, William	Hastings
1853		Lewin, Edwin C.	Boston
1841		Lewin, William	Plymouth
1853		Lewis, Thomas V.	Ebbw Vale
1856	310	Lewis, Thomas Cooper	Rugby
1842		Lidington, George	Bilston
1857		Limon, Henry	Burgh
1841		Lindsay, Robert	Edinburgh
1857	406	Lingwood, James Grace	Northampton
1841		Lines, George	Hertford
1849		Linsley, Thomas	York
1844		Lister, George	Cottingham
1854	215	Littlefield, James Wavell	Ventnor, Isle of Wight
1842		Lloyd, Edmund	Richmond
1856	436	Lloyd, Henry	Richmond
1853		Lloyd, Henry	Deptford
1853		Lock, William	Boston
1846		Lockyer, George	Deptford
1841		Lofthouse, James	Hull
1859	236	Logan, Richard	Edinburgh
1853		Loggin, Charles Frederick	Stratford-on-Avon
1859		Long, William Elliot	Chichester
1858	479	Long, Henry	Croydon
1853		Longfield, Joseph	Leeds
1853		Longrigg, John	Appleby
1853		Lord, Ellis	Rochdale
1853		Lord, Charles	Todmorden
1853		Loveitt, George	Coventry
1853		Loveridge, Thomas	Merthyr Tydfil
1841		Lovett, John	Gloucester
1841		Lowe, Thomas	Liverpool
1842		Lowndes, Hervey	Stockport
1841		Loye, Philip	Plymouth
1853		*Luff, William	Oxford
1853		Lumsden, James	Peterhead
1853		Lupton, Thomas	York
1842		Lynch, John R.	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Mabson, William	Great Yarmouth
1842		Macfarlan, John F.	Edinburgh
1852	139	Macfarlane, Wardlaw	Edinburgh
1853		McDiarmid, John B.	Deal
1853		McGregor, Andrew	Glasgow
1853		McGuffie, John R.	Liverpool
1841		Mackay, John	Edinburgh
1852		Mackenzie, Duncan	Edinburgh
1852		Mackintosh, Archibald	Rothesay
1856	140	Mackintosh, James	Galashiels
1841		Maddock, William	Tunbridge Wells
1853		Madge, James C.	Devizes
1848		*Maggs, Samuel Blount	St. Leonards
1845		Maggs, Thomas C.	Yeovil
1845		Maleham, Henry	Sheffield
1844		Maling, William	Newcastle-on-Tyne
1842		Manfield, John W.	Salford
1853		Manifold, John J.	Weaverham
1841		Manthorp, Samuel	Colchester
1850		March, William	Newark
1845		Marder, John J. W.	Lyme Regis
1857	481	Maries, Henry Davies	Watford
1846		Marks, George	Bradford-on-Avon
1857	205	Marks, Edward L.	Swansea
1853		Marlor, Jabez	Lees, near Oldham
1849		Marrison, George O. R.	Tasmania [dale
1845		Marsden, Joseph	Middleton-on-Tees-
1842		Marsh, William M.	Sevenoaks
1842		Marshall, John F.	Gainsborough
1853	311	Marshall, Robert	Boston
1842		Marshall, James A.	Waltham Abbey
1842		Marston, Richard	Ludlow
1841		Martin, John	Bristol
1842		Martin, Edward W.	Guildford
1845		Martin, Thomas	Lewes
1853		Martin, Thomas	Liverpool
1851		Martin, Henry G.	St. Albans
1853		Martyn, John Jones	Brighton
1853		Massey, Joseph	Oldham
1853		Mason, Joseph W.	Cirencester
1842		Mason, William W.	Manchester
1853		Mason, William	Hastings
1853		Mather, William	Manchester
1853		Maunder, Alexander	Weston-super-Mare
1848		Maunder, Frederick	Sheffield
1853		Mawson, John	Newcastle-on-Tyne
1842		May, Enoch	Tewkesbury
1848		Maynard, Robert H.	Brandon
1842		Mays, Robert James John	South Shields
1843		Meadows, John	Leicester
1842		Mease, Solomon	North Shields
1853		Mease, Robert D.	North Shields
1842		Meatyard, Robert	Basingstoke
1853		Medd, Joseph	Gloucester
1842		Medcalf, Benjamin	Ware

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1843		Medcalf, Ebenezer	Lower Tooting
1857	215	Medley, William	Derby
1845		Medwin, Aaron	Blackheath
1853		Meredith, Edwin Richard	Bristol
1850		Merrick, Thomas J.	Northampton
1853		Merryweather, Charles	Leicester
1854	106	*Metcalfe, Christopher L.	Hull
1853		Michell, John A.	Falmouth
1857	485	*Michell, Frederic	Hampstead
1853		Millais, Thomas	Jersey
1853		Miller, Jeptha	Saffron Walden
1842		Miller, Charles	Oxford
1843		Miller, Robert P.	Reading
1853		Miller, William Henry	Sheffield
1853		Miller, John Thomas	Sheffield
1853		Mills, James Arthur	Dereham East
1845		Mills, Robert Mason	Bourne
1847		Mitchell, John	Manchester
1853		Mitchell, Thomas	Sunderland
1842		Mole, William Tingey	St. Neots
1846		Monro, Henry L.	Gateshead
1844		Moor, Joseph	Hull
1846		Moore, John	Blackpool
1841		Moore, R. C.	Brighton
1841		Mordaunt, Alfred	Southampton
1841		*Mordaunt, John	Tunbridge Wells
1853		Morgan, William	Pillgwinlly
1844		Morris, Alfred Philip	Stourbridge
1844		*Morse, George	Mortlake
1852		Morton, John	Durham
1853		*Morton, Jameson	Ramsbottom
1845		Morton, Henry	Ramsgate
1844		Morton, George	Stratford-le-Bow
1849		Moss, William	Carlisle
1853		Mount, William	Canterbury
1842		Mount, John	Manchester
1853		Mousley, William	Redditch
1841		Mullett, Charles	Ilminster
1847		Mumbray, Robert George	Manchester
1853		Mumby, Charles	Gosport
1853		Munday, Edward Smith	Worthing
1851		Mundy, William	Melksham
1853		Murdoch, David	Falkirk
1853		Murdoch, William	Glasgow
1852	63	Murdoch, George	Glasgow
1849		Murdoch, James	Glasgow
1841		Muriel, Harry Brooke	Brighton
1849		Muskett, Charles	Derby
1842		Muskett, James	Harleston
1844		Musson, Telemachus G.	Birmingham
1842		Napier, James	Edinburgh
1853		Narracott, Henry	Torquay
1848		Naftel, Thomas S.	Guernsey
1856	262	Needham, Slater	Leicester
1842		*Negus, Samuel	Northampton

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Newbery, Henry	Biggleswade
1853		Newby, William Henry	Perth
1853		Newcome, John	Grantham
1854		Newman, Robert	Bewdley
1845		Newman, Thomas	Hartley Row
1853		Newman, Walter F.	Falmouth
1853		Newton, George	Newcastle
1847		Newton, Christopher	Edinburgh
1853		Niblett, John	Stroud
1852		Nicol, George	Pulteney Town
1853		Nicholas, John	Narberth
1841		Nicholls, James	Stourbridge
1843		Nightingale, Henry L.	Egham
1845		Nind, George	Wandsworth
1853		Nix, John K.	Billericay
1841		Noakes, Richard	Brighton
1858	522	Noble, Alexander	Edinburgh
1846		Northcroft, Jonathan	Plymouth
1853		Norwood, Thomas	Hastings
1842		Oakey, Joseph Malpas	Preston
1853		Oliver, John	Liverpool
1842		Orange, John	Portsea
1845		Otter, William	Bloxham
1842		Overbury, Henry	Alcester
1845		Owen, Griffith	Caernarvon
1842		Owen, William	Newcastle-on-Tyne
1845		Owles, James	Bungay
1842		Owles, John	Yarmouth
1842		Paine, William	Canterbury
1841		Palk, Edward	Southampton
1841		*Palk, John	Exeter
1853		Palmer, Charles F.	Birmingham
1853		Palmer, Henry	Birmingham
1847		Palmer, Faithful	Cheltenham
1842		Palmer, Thomas J.	East Grinstead
1842		Parker, Edward	Carlisle
1853		Parker, Frederick	Derby
1853		Parker, John	Birmingham
1853		Parker, Matthew	Bath
1853		Parker, William Henry	Nottingham
1841		Parker, Thomas	Halifax
1842		Parkes, Joseph	Atherstone
1842		Parkes, Thomas	Woolwich
1853		Parkes, John C.	Woolwich
1854	312	*Parkes, John P.	Manchester
1842		Parkinson, Thomas	Liverpool
1847		Parkinson, Robert	Bradford
1841		*Parnell, John	Peterborough
1842		Parsons, Thomas	Leicester
1850		Parsons, William	Portsmouth
1853		Parton, Joseph	Nantwich
1353		Pasmore, George	Portsmouth
1853		Pate, Henry Thomas	Ely
1853		Paterson, William	Aberdeen
1853		Patterson, George	Stamford

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1858	453	*Patterson, Douglas John	Mansfield
1853		Pattinson, Richard John	Carlisle
1841		Paul, Horace	Halsted
1853		*Paulden, William	Altrincham
1841		Payne, Reuben Craven	Bridgewater
1854	314	Peake, Henry	Dover
1855	313	Peake, James	Walmer
1842		Pearce, Thomas	Gloucester
1852		Pearless, John	East Grinstead
1853		Pearman, Henry	Stourbridge
1842		Pearson, Charles James	Loughor
1851		Pearson, Edward	Liverpool
1842		Peart, David	Ewell
1842		Peat, Walter	Fareham
1853		Peatson, Henry Robert	Salford
1853		Pegg, Herbert	Birmingham
1852		Penney, William	Poole
1853		Penrice, Joseph	Workington
1851		Peppercorn, Benjamin	Lincoln
1855		Perfect, George	Portsea
1841		Perrins, William	Worcester
1843		Perry, Solomon	Tavistock
1853		Pertwee, Edward	Romford
1853		Pertwee, Alfred R.	Chelmsford
1853		Phillips, John	Birmingham
1852		Phillips, Edward James	Newport, Monmouth
1853		Phillips, John	Newport, Monmouth
1856	326	Phillips, William Thomas	Carmarthen
1845		Philpott, John	Bromyard
1842		Pickering, Henry	Leicester
1853		Pickering, Atkinson	Hull
1845		Pickup, Thomas Hartley	Blackburn
1841		Pickup, John	Manchester
1848		Pickup, Varey	Salford
1859	301	Picnot, Charles	Strood
1858	431	*Pidduck, John	Brompton
1853		Pidgeon, Henry	Shrewsbury
1853		Pidgeon, John	Taunton
1841		Pierce, Edward Lloyd	Shelton
1853		Pilley, Samuel	Boston
1853		Pilley, John	Boston
1853		Piquet, John	Jersey
1853		Pissey, William	Rayleigh
1853		Pitts, Robert Christopher	Norwich
1859	289	Place, William Thomas	Wakefield
1853		Player, Edmund	Bristol
1842		Plomley, James Foulis	Rye
1842		Pocklington, James	Sydenham
1853		Pollard, William J.	Nailsea
1852		Ponting, Thomas Cadby	Bristol
1845		Pooley, John Carpenter	Bath
1854	15	Porter, William Henry	Rochester
1846		Portway, John	Bury St. Edmunds
1853		Potts, Thomas	Newcastle-on-Tyne
1855		Poulton, John	Newton Abbott

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1852		Powell, Frederick W.	Leith
1842		Powell, John	Shaftesbury
1842		Powell, Edward	Winchester
1852		Power, Edward	Walton-on-Thames
1841		Pratt, John	Chichester
1846		Pratt, John	Bradford
1853		Pratt, Richard Munton	Otley
1853		Priestlay, Henry	Pontefract
1841		Priestley, John Henry	Liverpool
1852		Prince, Henry	Taunton
1855	290	*Pring, Walter	Taunton
1855		Prior, George T.	Oxford
1842		Prockter, Richard Edgcumbe	Cheltenham
1841		*Procter, William	Liverpool
1853		Procter, Joseph	Barnard Castle
1848		Proctor, William	Newcastle
1841		Proctor, William B.	Newcastle
1857		Proctor, Barnard S.	Newcastle
1859	384	Prosser, Thomas Evan	Woodstock
1852	144	*Prott, William, jun.	Huntley
1842		Prout, Robert	Milton Abbott
1852	327	Prowse, Charles	Bristol
1853		Pryer, William Symes	Axminster
1852		Pullin, Edwin	Northampton
1841		Purdue, Thomas	Witney
1855	355	*Pyne, Joseph J.	Manchester
1853		Quine, James	Douglas, Isle of Man
1851		Radford, Isaiah C.	Devonport
1841		Radley, William Valentine	Sheffield
1853		Rae, James	Chicago, U.S.
1842		Raimes, Richard	Edinburgh
1853		Rait, Robert C.	Partick
1853		Ralfs, Henry Charles	Brentford
1853		Ramsey, Henry P.	Ashford
1841		Ramskill, Parson	Leeds
1841		Randall, Edward Mayor	Southampton
1845		Randall, William Brodribb	Southampton
1853		Randall, Thomas	Wareham
1853		Randleson, William	Whitehaven
1853		Ranken, James Anderson	Forfar
1848		Rankin, William	Kilmarnock
1842		Ransford, Samuel	Cleveden
1853		Ransom, William	Hitchin
1853		Ransome, Thomas	Manchester
1851		Rastrick, George T.	Geelong
1853		Rastrick, William Henry	Portsea
1842		Rastrick, Joseph Linington	Southsea
1842		Rastrick, John Alfred	Woolwich
1841		Raw, John	Preston
1853		Rawdin, Joseph	Jedburgh
1854	206	Rayner, John	Nottingham
1852		Rayner, John	Uxbridge
1842		Reading, Robert Grant	Warwick
1841		Readman, William	Leighton Buzzard

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Redfern, John	Ashby-de-la-Zouch
1853		Redmayne, Christopher	Warrington
1853		Rees, William Henry	Dartmouth
1853		Reid, David	Aberdeen
1853		Reid, John	Montrose
1857	251	Reid, Neil	Perth
1856		Reilly, William Charles	Hampstead
1845		Reinhardt, Johaan Christian	Hull
1841		Reinhardt, George	Leeds
1848		Rendall, John M.	Torquay
1842		Reynolds, William	Halesworth
1854	109	Reynolds, Richard	Leeds
1849		*Rhodes, Frank	Wycombe
1853		Rhodes, James	Manchester
1853		Rich, Thomas	Weston-super-Mare
1853		*Richards, William	Falmouth
1853		Richardson, Allen	Manchester
1842		Richmond, Robert	Leighton Buzzard
1842		Rimmington, Felix U.	Bradford
1842		Ritson, John George	Sunderland
1842		Ritson, Thomas	Sunderland
1847		Roberton, James	Manchester
1853		Roberts, Thomas A.	Conway
1852		Roberts, Griffiths J.	Holyhead
1842		Roberts, Charles	Westbury
1841		Roberts, Albinus	St. Albans
1851		Roberts, Edwin	Liverpool
1858	483	Roberts, Peter	Denbigh
1852		Robertson, James	Edinburgh
1853	331	*Robertson, Thomas Berkley	Cullen
1854		Robinson, Levi	Alford
1842		Robinson, James Mowld	Beverley
1855	249	Robinson, Ralph	Durham
1842		Robinson, Charles S.	Hammersmith
1855	193	Robinson, Benjamin	Pendleton
1853		Robinson, James	Nottingham
1851		Robson, Thomas	Brighton
1842		Robson, George	Durham
1853		Rodgerson, William	Liverpool
1847		Roe, Septimus	Salisbury
1842		Roe, Thomas	Ollerton
1853	5	Rogers, John Robinson	Honiton
1853		Rogers, William	Maidstone
1842		Rogers, John	Ledbury
1842		Rogerson, Michael	Bradford
1853		Rome, Robert M.	Langholm
1853		Rook, Edward	Sittingbourne
1853		Rooker, Abel	Chepstow
1851		Roose, Robert	Ruthin
1845		Ross, Stephen	Lancaster
1853		Row, Charles	Devonport
1843		Rowe, John	Plymouth
1853		Rowlands, Thomas	Epping
1853		Rowlands, William S	Devizes

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Ruffe, Frederick	Tamworth
1846		Russell, Thomas	South Shields
1853	84	Russell, Charles J. L.	Windsor
1853		Rust, James	Harwich
1853		Rutherford, Thomas H.	Seaham Harbour
1853		Sagar, Henry	Leeds
1841		Salisbury, John	Sheffield
1858	219	Salisbury, William Bryan	Leicester
1842		Sanders, Henry Wotton	Bristol
1847		Sandiland, Robert B.	Bicester
1853		Sangster, John	Aberdeen
1853		Satterley, William B.	Guernsey
1845		Saunders, David Price	Haverfordwest
1853		Saunders, George J.	Oswestry
1841		Savage, William Dawson	Brighton
1853		Sawer, William	Stroud
1841		Sawyer, Thomas	Ramsgate
1842		Sawyer, James	Carlisle
1853		Saxby, Henry	Lewes
1852		Scarrow, William	Sunderland
1846	2	Schacht, Frederick George	Clifton
1856		Scholefield, George	Birkenhead
1853		Scott, Edward	Birmingham
1857	317	Scott, George	Bury St. Edmunds
1856	426	Searby, William M.	Norwich
1854	239	Seath, Alexander	Dunfermline
1847		Seaton, John Love	Hull
1849		Seaton, George	Chelmsford
1841		Selfe, Isaac	Bristol
1852	60	Sessions, Joseph James	Godalming
1843		Severs, Joseph	Kendal
1846		Sewell, James C.	Sheffield
1853		Sewell, John Holmes	Swindon
1841		Seyde, John F.	Willenhall
1841		Shackel, John Well	Maidenhead
1853		Shadford, Major	Spalding
1853		Sharland, Edmund T.	Bristol
1853		Sharp, Benjamin	Warrington
1847		Sharp, Henry	Christchurch
1842		Sharpe, Joseph	Salford
1841		Sharples, William	Preston
1843		Sharples, George	Preston
1853		Shattock, John	Taunton
1848		Shaw, John	Liverpool
1842		Shaw, Alexander Henry	Stockport
1854		Shenstone, James B.	Colchester
1853		Shepherd, James	Aberdeen
1857	371	Shepherd, George Prentis	Guildford
1848		Shepperley, James	Nottingham
1853		Shield, Spooner	Liverpool
1842		Shillcock, Joseph Bradley	Bromley, Kent
1841		Shum, Henry	Swansea
1853		Sidebottom, William	New Mills
1842		Silvester, Joseph	Knutsford

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Sim, James	Aberdeen
1842		Simonds, William	Boston
1843		Simpson, John	Hull
1842		Simpson, Thomas	Stowmarket
1853		Sinclair, William	Aberdeen
1853		Sincock, William	Andover
1852		Sircom, Richard	Bristol
1841		Sirett, George	Buckingham
1843		Slater, William Boocock	Blackburn
1853		Slayter, George	Reading
1852		Smale, William	Oswestry
1853		Smale, Richard Bill	Oswestry
1843		Smallwood, John Wright	Macclesfield
1853		Smart, Nevill	Littlehampton
1841		*Smeeton, Edward	Leeds
1859	454	Smeeton, William	Ironbridge
1853		Smethurst, Richard L.	Salford
1853		Smith, John	Aberdeen
1842		*Smith, William	Abingdon
1853		Smith, William	Bridlington
1853	169	Smith, William	Brighton
1841		Smith, Nathaniel	Cheltenham
1841		Smith, Thomas	Colchester
1853		Smith, Henry	Eccleshall
1853		*Smith, Thomas	Edinburgh
1842		Smith, Henry	Edinburgh
1853		Smith, James S. T. W.	Haltwhistle
1856	416	*Smith, Thomas J.	Hull
1853		Smith, Josias	Hyde
1842		Smith, William	North Shields
1849		Smith, William	St. Andrews
1843	31	Smith, John	Southampton
1842		Smith, William	Sutton Coldfield
1842		Smith, Alfred	Tenterden
1842		Smith, James Russell	Woodbridge
1842		Smith, William	Woolwich
1853		Smyth, Walter	Merthyr Tydvil
1842		Snape, Edward	Birmingham
1841		Southall, William	Birmingham
1841		Southall, Thomas	Birmingham
1850		Southall, William, jun.	Birmingham
1842		Sowerby, John	Carlisle
1852		Spence, Thomas B.	Dundee
1843		Spencer, Charles	Gravesend
1842		Spencer, William	Monmouth
1853		Spencer, William Henry	Burnham Market
1853		Spencer, Thomas	Wokingham
1853		Spencer, George	Lincoln
1842		Spettigue, Joseph	Launceston
1842		Spicer, Thomas	Ilfracombe
1853		Spokes, Peter	Reading
1845		Spong, Thomas Willsden	Biggleswade

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1853		Spurr, John	York
1842		Squire, William	Hanwell
1853		Squire, William	Nottingham
1853		Squire, William	Goole
1853		Stafford, William	Gloucester
1842		Standring, Thomas	Manchester
1842		Stantial, John	Corsham
1847		Stead, William	Horbury
1856	291	Steel, Henry	Shefford
1853		Steel, Samuel	Beccles
1855	148	Steele, David	Edinburgh
1853		Sterriker, John	Driffield
1853		Stephens, Thomas	Merthyr Tydvil
1858	492	*Stephenson, John B.	Edinburgh
1849		Stevens, John	Birmingham
1852		Stevens, George	Strood
1846		Stevenson, Richard	Derby
1842		Steward, Charles S. Dale	Yarmouth
1854	278	Steward, Alfred	Yarmouth
1847		Steward, William	Bridgnorth
1841		Steward, Josiah	Kidderminster
1841		Steward, Theophilus	Kidderminster
1853		Steward, John	Brierley Hill
1858		Stewardson, Henry	Bedford
1841		Stiell, Gavin	Dunfermline
1858	491	*Stirling, George	Dunoon
1853		Stoddart, William Walter	Bristol
1853		Stone, John	Exeter
1852		Stonham, Thomas G.	Maidstone
1841		Stott, William	Sowerby Bridge
1853		Strange, William Bond	Bristol
1847		Strawson, Henry	Crewkerne
1856	292	Stroud, John	Bristol
1853		Stuart, Henry James	Ingatestone
1842		Stuart, Charles	Woolwich
1853		Stuart, Henry W.	Woolwich
1853		Sturton, Joseph	Cambridge
1841		Sturton, John	Peterborough
1855	394	*Sturton, Richard	Peterborough
1853		Sugden, Samuel	Newchurch
1853		Suggate, Henry Ezra	Great Yarmouth
1852		Sumner, Robert	Liverpool
1855	170	Sumner, William	Birmingham
1852		Sumner, John	Birmingham
1853		Sutcliffe, William	Stalybridge
1853		Sutherland, John	Aberdeen
1853		Sutterby, Jonathan N.	Long Sutton
1853		Sutton, Francis	Norwich
1843		Symonds, John	Aylsham
1853		Symons, William	Dunster
1847		Sympson, Charles	Lincoln
1852	149	Tait, William	Edinburgh
1845		Talbot, John H.	Liverpool
1841		Tanner, Nicholas William	Exeter
1853		Taplin, Joseph	Bristol

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1847		Tarzewell, Richard	Braintree
1841		Tatham, John Walkingame	Barnstaple
1852		Tatham, Leonard F.	Bradninch
1845		Tayler, William Henry	Warminster
1848		Taylor, John Usher	Bedford
1842		Taylor, James	Manchester
1853		Taylor, Henry	Manchester
1842		Taylor, Thomas H.	Manchester
1850		Taylor, Sydney	Pendleton
1841		Taylor, John	Preston
1852		Taylor, John Hawarden	Preston
1853		Taylor, Thomas John	Preston
1853		Taylor, John	Rawtenstall
1842		Taylor, Edward	Rochdale
1854	362	Taylor, Richard	Ryde
1842		Taylor, Thomas	Stalybridge
1852		Taylor, John	Wakefield
1842		Taylor, Stephen	Westbury
1848		Teasdale, Thomas B.	Darlington
1842		Teear, John Manshaw	Leicester
1842		Telfer, Frederick	Oxford
1853		Templeton, John	Glasgow
1842		Thomas, John Holliday	Boston
1852		Thomas, Robert	East Looe
1846		Thomas, Richard	Burnley
1853		Thomas, Morgan	Cardiff
1853		Thomas, John	Cowbridge
1853		Thomas, James	Bridge, Kent
1853		Thomas, James	Hythe
1853		Thompson, George	Alston
1846		Thompson, Andrew	Carlisle
1849		Thompson, John	Liverpool
1842		Thompson, Henry	Middlesborough
1853		Thompson, Henry	Norwich
1846		Thompson, Edward	Otley
1850		Thompson, Thomas	Richmond, Yorkshire
1853		Thompson, William	Sunderland
1841		Thompson, John	Thirsk
1853		Thonger, Gilbert	Birmingham
1853		Thorne, John	Bedford
1853		Thornton, John	Wedmore
1853		Thornton, Edward	Lyme Regis
1842		Thornton, Samuel	Exmouth
1857	417	Thornton, John Barber	Dover
1853		Thurland, Edward	Oxford
1853		Tiernan, Robert	Liverpool
1853		Timothy, Thomas Norris	Reading
1841		Titherington, Thomas A.	Liverpool
1843		Tomlinson, Charles Knowles	Lincoln
1847		Tonge, James Scawin	York
1853		Toone, Joseph Vidler	Warminster
1853		Townsend, John H.	Bristol
1853		Townson, Thomas	Leamington
1842		Tozer, Richard John	Exeter

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1841		Tribe, John	Chatham
1841		*Trix, John	Exeter
1852	150	Trotter, George	East Linton
1841		Trueman, William	Durham
1853		Truman, Francis C.	Jersey
1841		Tryon, William George	Portsea
1842		Tuck, William H.	Torquay
1857	342	*Tuck, Francis	Oxford
1843		Tucker, Charles	Bridport
1853		Tucker, James	Gloucester
1853		Tuff, John	Enfield
1842		Tunley, John	West Bromwich
1853		Turner, Robert	Oundle
1845		Turner, Thomas	Newcastle-under-Lyne
1856	264	Turner, Walter	Mold
1851		Turner, Frederick E.	Holywell
1854	265	Turner, William Henry	Birkenhead
1853	162	Turney, Samuel B.	Cambridge
1853		Turton, Luke	Bradford
1853		Turton, Thomas J.	Howden
1859	516	*Twinberrow, John	Worcester
1841		Tylee, John P.	Bath
1853		Urquhart, James	Aberdeen
1852		Urwin, John	Bedlington
1853		Veitch, James	Dunse
1853		Veitch, William	Shildon
1845		Vincent, Philip	Fulham
1841		*Visick, Robert Goodyear	Brighton
1853		Vose, Thomas	Liverpool
1842		Wain, William	Ripley
1842		Wainwright, James	Howden
1842		Waite, Joseph	Cheltenham
1853		Walker, John C.	Birmingham
1853		Walker, John	Bradford
1841		Walker, George Clarke	Doncaster
1842		Walker, Edward Hawxby	Doncaster
1853		Walker, Thomas D.	Liverpool
1842		Walker, William	Malmsbury
1847		Walker, Edward	Newcastle-on-Tyne
1846		Walker, William N.	Southport
1842		Walkinton, William	Tenby
1848		Wall, William James	Tottenham
1857	75	Wallworth, David	Maldon
1854	343	Walsh, Edward	Manchester
1852		Walsh, William	Oxford
1853		Walter, Joseph	Horncastle
1848		Walton, John	Sunderland
1842		Warburton, Thomas	Bolton
1841		Ward, James	Falkingham
1845		Ward, James	Richmond, Yorkshire
1853		Ward, Francis	Battle
1851		Ward, William	Sheffield
1853		Wardle, William Henry	Stalybridge
1842		Warren, James	Portsea

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1842		Warrior, William	Northallerton
1853		Waterall, George	Nottingham
1853		Waterall, George Edwards	Nottingham
1853		Waterfall, William	Newcastle
1842		Watkins, George H.	Walsall
1853		Watkinson, Thomas	Cinderford
1841		Watlock, John Dawson	Wandsworth
1846		Watson, Henry	Cambridge
1847		Watson, Edward M.	Worle
1853		Watt, James	Haddington
1853		Wavell, John	Ryde
1853		Wearing, William	Lancaster
1853		Wearing, William Henry	Liskeard
1848		Wearing, Richard	Liverpool
1842		Weaver, Frederick	Wolverhampton
1853		Webb, Thomas S.	Bilston
1853		Webber, George William	Torquay
1853		Webster, Edwin P.	Newcastle-on-Tyne
1852		Webster, Samuel M.	Warrington
1845		Weeks, Caleb	Torquay
1853		Welch, Charles	Nottingham
1844		Weller, George	Windsor
1850		Wellington, Frederick G. N.	South Petherton
1842		Wellington, James Martin	Oakham
1853		Wellman, William Richard	Jersey
1852		Welsh, Alexander	Dalkeith
1853		West, Henry James	Coventry
1850		West, Isaac	Oxford
1856		West, William	Henfield
1846		Westall, Richard H.	Ramsgate
1853		Westmacott, George	Manchester
1854	180	Wharrie, Decimus	Liverpool
1854	156	*Wheeler, Francis	Norwich
1847		Wheeler, John	Chipping Sodbury
1846		Wheeler, James Edward	Ryde
1842		Whimpray, John	Lancaster
1853		Whitall, James	Chertsey
1853		White, Frank	Nottingham
1842		White, Robert Rowles	Dursley
1850		White, Luke P.	Peniston
1842		White, Thomas	Bilston
1846		White, George	Havant
1846		Whitehead, Edwin	Fleetwood
1853		Whitehead, John	Rochdale
1842		Whitfield, John Lockley	Worcester
1847		Whitfield, John	Worcester
1846		Whitlock, Edwin	Salisbury
1853		Whittaker, William	Runcorn
1852		Whittaker, Ellis	Salford
1853		Whittle, Samuel	Leigh
1841		Whitton, George	Horncastle
1852		Whitwell, John	Thirsk
1845		Wibmer, Lewis Michael	Tunbridge
1853		Wice, Jonathan Haigh	Wakefield

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1849		Wickham William	Deptford
1842		Wigg, John Goddard	Lynn
1845		Wiggin, John	Ipswich
1853		Wild, Joseph	Hyde
1853		Wild, David	Oldham
1847		Wilde, Eli	Manchester
1852		Wilkes, Seth Martin	Tewkesbury
1850		Wilkes, Doctor Tyers	Upton-on-Severn
1842		Wilkes, William	Bromyard
1858		Wilkes, David	Bredon
1850	73	Wilkinson, William	Manchester
1854		Williams, Joel D.	Bodmin
1853		Williams, William	Haverfordwest
1844		Williams, Walter	Hereford
1853		Williams, Philip	Horsham
1853		Williams, John	Leamington
1853		Williams, Robert	Liverpool
1854		Williams, Terrick J.	Liverpool
1853		Williams, Edwin	Manchester
1857	474	*Williams, Henry Levi	Newport, Monmouth
1842		Williams, William	Nottingham
1842		Williams, David	Pwllheli
1859	531	*Williams, Thomas Kemble	Welchpool
1844		Williamson, James	Hunslet
1853		Willmott, Charles	Brighton
1855	171	Wills, Thomas D	Barnstaple
1853		Wilshaw, James	Wordsley
1842		Wilson, Thomas	Bradford
1844		Wilson, Joseph	Canterbury
1853		Wilson, John	Harrogate
1855	303	Wilson, Joseph	Penrith
1853		Wilson, Edward	Sheffield
1841		Wilson, Charles Thomas	Swansea
1854		Wilson, William	York
1841		Wine, John	Bristol
1842		Wing, Thomas N.	Melton Mowbray
1856	254	Wingate, Stephen	Gloucester
1847		Withers, Richard	Blackwater
1842		Witherington, Thomas	Worcester
1853		Withey, William Henry	Stroud
1842		Wood, Edwin	Abersychan
1853		Wood, Anthony	Arnold
1846		Wood, Henry	Brentford
1852	111	Wood, Edward	Brighton
1853		Wood, Benjamin	Halifax
1853		Wood, John Edward	Harlow
1842		Wood, William Webb	Pontypool
1853		Woodcock, Page D	Lincoln
1842		Woods, William	Worcester
1853		Woodward, Charles	Ryde
1853		Woodward, William	Langport
1853		Woodward, William	Nottingham
1842		Wooldridge, Thomas	Windsor
1858	521	*Woolley, George Stephen	Manchester

Year of Membership.	No. of Certificate.	NAME.	RESIDENCE.
1844		Woolley, Daniel	Stockport
1854		Woolrich, Thomas	Stone
1850		Wootton, William	Wolverhampton
1856	255	Wortley, John	Durham
1842		Wreaks, Thomas Peacock	Glossop
1842		Wreaks, George D.	Sheffield
1853		Wright, Joseph	Ardwick
1853		Wright, James	Chesterfield
1853		Wright, William	Liverpool
1846		Wright, George Warren	Macclesfield
1842		Wright, Charles	Manchester
1844		Wright, John James	Sheffield
1853		Wyatt, Samuel	Tottenham
1845		Wylde, John	Manchester
1845		Wylde, James	Manchester
1841		Wyley, John	Coventry
1852	153	Young, James R.	Edinburgh
1844		*Young, John	Sunderland
1853		Young, Tonkin	St. Ives
1853	224	Youngman, Edward	Bury St. Edmunds
1855	345	*Youngman, Robert	Cambridge

ASSOCIATES

ADMITTED BEFORE THE 1st OF JULY, 1842.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Baigent, William H.	London	Mornement, Henry J.	London
Baker, Garrad...	Chelmsford	Peat, William H.	Ryde
Bannick, Henry Stokes.	London	Roberts, William	Bolton
Barber, William Jas.	London	Ryder, William Henry.	Birmingham
Beaton, John William	London	Sawyer, Henry	Ramsgate
Bell, William	Carlisle	Scholefield, Henry	London
Bowman, William	London	Scott, Thomas	Coleshill
Brewster, Godfrey W.	Cambridge	Selleck, Edward	London
Brown, Henry F.	London	Soulby, Henry	Beaconsfield
Buss, Thomas	London	Steele, John W.	London
Chadwick, Henry	London	Sylvester, Paul	Birmingham
Charity, William	Alford	Thompson, Morley	London
Dallas, John	London	Tilburn, Robert J.	Sheffield
Dew, Joseph Jennings.	London	Townsend, Charles	London
Dunn, Edward	London	Turner, George	Honiton
Handsley, Taylor	London	Walker, Henry	London
Hindsley, Henry	London	Walker, William	Malmsbury
Holt, Isaac	Manchester	Warren, William A.	Malmsbury
Lee, James	London	Webb, John W.	Gloucester
Mackay, John	Worcester	Were, Ellis	London
Mackey, John B.	London	Williams, Walter C.	Brentwood
Middleton, Francis	London	Wood, John	London
Morgan, William B.	London		

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MAJOR EXAMINATION.

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1849	76	Alexander, William	Peckham
1857	477	Andrew, Leyshon	Swansea
1851	533	Anthony, John Lilley	Bedford
1858	510	Ashton, John	Belper
1851	419	Atkins, Ernest R.	Woolwich
1858	537	Baldock, John Henry	London
1856	484	Banner, Samuel	Liverpool
1846	424	Barker, Matthew Mark	York
1854	374	Barnsby, Robert David	Tours
1853	256	Barry, Thomas	Aberavon
1847	243	Bates, James	Burslem
1848	402	Beach, James	Bridport
1853	346	Bennett, Robert	Lincoln
1855	496	Berger, Volcy	Clapham
1852	208	Blackburn, Francis	Ramsgate
1856	449	Bloye, Henry	Holt
1856	518	Bolton, Horatio Nelson	Boston
1857	495	Boucher, John	Belper
1853	209	Boyce, George	Chertsey
1853	444	Calvert, John	Durham
1853	376	Chapple, Edwin	Bideford
1853	527	Chater, Edward Mitchell	Watford
1854	380	Christopher, James	Crickhowell
1857	528	Clark, John	Grantham
1846	91	Copney, William	London
1854	466	Cornelius, James	Clapham
1855	469	Cornell, William	Ipswich
1856	480	Cortis, Edward Charles	Worthing
1848	367	Cotton, John L.	Barnstaple
1853	395	Cracknell, Benjamin	Halesworth
1852	535	Crossby, Joseph Parker	Bakewell
1850	470	Cutting, James	Stowmarket
1851	351	Daines, Thomas	London
1848	377	Davies, William G.	Shrewsbury
1852	523	Deighton, Thomas Milner	Worcester
1853	524	Dowse, Thomas Stretch	Bradford-on-Avon
1853	229	Duncanson, William	Glasgow
1857	539	Dunhill, William Workman	Doncaster
1853	324	Edman, Bonner	Lincoln
1846	493	Essery, William	Plymouth
1853	368	Evans, William H.	Haverfordwest
1852	462	Eyre, Joshua J.	Manchester
1856	464	Featherston, John P.	London

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1853	336	Fisher, William F.	London
1855	421	Fouracre, Robert	Salisbury
1851	540	Fowler, Robert John	Leeds
1858	511	Francis, Thomas Harper	Dulwich
1853	283	Freeman, William	Devizes
1850	92	Fyfe, John L.	Brighton
1850	403	Gibbons, George	Clifton
1856	471	Gill, Hugh	Selby
1858	525	Gray, Frederick	London
1856	446	Green, John	Oundle
1854	529	Griffiths, Alfred William	London
1856	438	Groves, Henry	Weymouth
1856	434	Halliday, William Jabez	Pontefract
1853	541	Hayward, Charles John	Lincoln
1853	353	Holroyde, William Henry	Bradford
1849	404	Hopwood, Thomas S.	Richmond
1856	448	Houghton, William	Warrington
1852	494	Humphreys, Richard	London
1857	497	Icke, Henry Scott	London
1856	476	Iverach, John G.	Kirkwall
1853	472	Johnson, Joseph	London
1848	382	Jones, Hugh Lloyd	Chester
1853	340	Jones, William Withers	Welchpool
1856	489	Jones, Peter Cooke	London
1852	418	Kemp, David Skinner	Edinburgh
1853	307	Kiddle, William L.	Bath
1853	287	Lawrence, William P.	Macclesfield
1857	478	Lee, John William	Liverpool
1856	300	Linford, John	Canterbury
1854	388	Lomas, Joseph W.	London
1853	330	M'Intyre, Peter S.	Warkworth
1856	451	Marks, Nelson S.	Cardiff
1853	247	Matterson, Edward H.	York
1857	512	Mee, George	Woolwich
1842	392	Mercer, Nathan	Liverpool
1858	507	Mercer, Nicholas	Liverpool
1853	216	Morgan, William	Richmond
1855	519	Nicholson, Frederick	London
1852	513	Nicholson, John Joseph	Sunderland
1857	482	Oliver, John Hamer	Salop
1856	520	Owles, John Edward	Southampton
1852	530	Paine, Standen	Brighton
1853	354	Parrott, John S.	Birmingham
1853	501	Parsons, Francis H.	Southam
1852	430	Payne, John	Leighton
1857	542	Pearson, George B.	Leeds
1847	425	Peel, James	Canterbury
1853	413	Penton, Charles W.	Maidstone
1850	414	Player, Jacob H.	Bedford
1853	422	Preston, Richard	London
1853	408	Rayner, William	Canterbury
1858	543	Rayner, John Charles	Uxbridge
1850	108	Reeve, Edward	London
1856	439	Reynolds, Arthur	Watton

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1855	440	Richards, Charles	Weymouth
1855	459	Richardson, John G. F.	Longton
1858	544	Richardson, Robert	Ipswich
1853	545	Roberts, John Albinus	Horsham
1849	393	Robbins, John	Launceston
1848	250	Rolfe, William A.	Wokingham
1855	461	Rowell, Charles Frederick	Uppingham
1853	463	Sarsfield, William	Durham
1856	452	Scholefield, Arthur	Basingstoke
1853	316	Scott, Thomas	Birmingham
1853	188	Sidley, Thomas Insall	Edinburgh
1852	207	Skrimshire, Thomas	London
1848	441	Smeeton, George H	Leeds
1853	356	Smith, Joseph	Birmingham
1853	349	Smith, Richard	Reigate
1857	475	Smith, William	Glasgow
1852	534	Southall, Joseph Sturge	Leeds
1842	46	Starkie, Richard S.	London
1853	509	Steevens, Joseph G.	Guildford
1853	514	Stewart, Charles John	London
1847	33	Swann, William H.	London
1855	409	Taplin, Frederick	Bristol
1853	221	Taylor, John N.	Lincoln
1853	502	Thompson, John Robert	Thirsk
1853	320	Thompson, Henry	Leatherhead
1856	498	Tiplady, Frederick	York
1853	532	Tollinton, Richard B.	Slowmarket
1853	515	Tucker, Henry	Henley-on-Thames
1856	427	Tyler, Henry Wing	Leicester
1853	266	Walmsley, Samuel	Wem
1853	253	Ward, Philip D.	Halifax
1858	517	Watson, David	Belper
1853	456	West, Robert G.	Liverpool
1856	455	Weston, Charles	Lincoln
1857	503	Wheldon, Henry William	London
1851	114	Whitfield, Henry	Worcester
1853	423	Willett, Edmund	Brixton
1855	442	Williams, David Martin	Truro
1853	399	Williams, John Thomson	Carmarthen
1849	293	Williamsen, David	Brighton
1854	359	Willmott, William	Bristol
1852	152	Wilson, James	Edinburgh
1853	360	Woodcock, Joseph	Leicester
1846	223	Yates, William	Bridgnorth
1855	443	Yates, Francis	London

ASSOCIATES OF THE SOCIETY

WHO HAVE PASSED THE MINOR EXAMINATION.

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1857	547	Allan, William	Dumfries
1853	441	Allingham, George Samuel	London
1852	161	Applegate, Edwin	Bradford
1856	424	Arnold, Spencer	Maidstone
1850	352	Attfield, John	Walworth
1859	580	Austen, Henry Felix	London
1859	573	Baker, Alfred Philip	Cosham
1854	567	Barnes, Edwin	Durham
1850	393	Baxter, George	Chester
1857	491	Bearcroft, Richard James	Cheltenham
1856	437	Bell, William M.	Stonehouse
1859	574	Benger, Frederick Benger	Harlow
1853	550	Bennett, George	Blandford
1858	535	Birrell, David	Detroit, U. S.
1857	520	Blackman, Thomas	Woolwich
1855	434	Bond, Charles Radcliffe	Ware
1853	581	Briggs, John Aston	Tipton
1855	461	Brown, John	London
1858	536	Brown, Charles Hills	Devonport
1852	178	Buchanan, James	Edinburgh
1853	568	Buzzard, Thomas Harley	Spilsby
1852	179	Cameron, William	Edinburgh
1859	582	Clapham, Edward	Leeds
1854	344	Clingan, William M.	Edinburgh
1853	543	Cocking, Thomas	Maldon
1852	205	Cobb, John Vinset	Deal
1853	575	Cook, William	Grantham
1848	226	Coles, Ferdinand	London
1853	457	Cutting, Thomas John	Selby
1852	443	Dakin, John	Chester
1856	531	Dallas, Clement	Woodbridge
1859	564	Davies, David	Cardigan
1855	487	Davis, Richard	Walworth
1856	488	Ereaut, John	Jersey
1856	418	Farr, Archer	Lambeth
1856	576	Fleetwood, Thomas	Stratford-on-Avon
1855	478	Fletcher, John	Camberwell
1857	492	Fowler, Charles Henry	London
1853	511	Gill, Levi John	Bridport
1855	405	Goddard, George	Lowestoft
1857	495	Goldfinch, George	London
1856	512	Green, James	Bath
1855	559	Green, Conrad Samuel	Stratford-on-Avon
1856	455	Grimwood, William	Ipswich
1853	341	Grundy, Thomas	London
1857	569	Haines, John Jenkins	Bromsgrove
1854	528	Hinton, Henry Archibald	London
1855	404	Harden, Charles	Bristol
1858	583	Hartley, William	Birmingham
1857	471	Harrow, Henry	Tunbridge Wells
1857	493	Hawkes, James	Birmingham

Year of Admission.	No. of Certificate.	NAME.	RESIDENCE.
1858	539	Hughes, Joshua	Crickhowell
1857	496	Hunneman, Charles Julius	Hanover
1847	56	Huskisson, William J.	London
1858	532	Ingall, Joseph	Wath-upon-Dearne
1852	184	Jamie, Robert	Edinburgh
1854	479	Jefferson, Thomas	Cambridge
1845	406	Johnson, Benjamin M.	Collumpton
1855	380	Jolley, Horace	London
1859	584	Jones, Robert William	Norwood
1853	338	Keeling, Thomas G.	Howden
1853	544	Laming, Welberry	Market Rasen
1854	345	Leighton, Thomas	Edinburgh
1855	399	Lloyd, David L.	Caernarvon
1852	332	Long, Henry	London
1846	359	Longstaff, Thomas	Sunderland
1855	475	Madgwick, William Butler	Alresford
1847	148	Matthews, William	London
1859	585	Maudsley, William	Preston
1858	533	Medwin, Aaron George	Greenwich
1849	91	Miller, Thomas L.	Blandford
1852	223	Mills, William P.	Macclesfield
1858	545	Moore, Francis Samuel	Bristol
1848	221	Murray, William S.	Berwick
1858	506	Muskett, Edwin Burrell	Holt
1858	502	Nesbit, John	Berwick
1852	521	Nock, Thomas Francis	Newcastle-und.-Lyne
1855	391	Nooten, Ernest Van	Edinburgh
1851	450	Nosworthy, Robert	Exeter
1853	292	Ostler, Charles	Galashiels
1859	579	Paris, Thomas	Salisbury
1858	523	Partridge, William	Dudley
1856	452	Pearson, Edward Smith	Liverpool
1859	570	Perrot, Pierre Bénoni	Mauritius
1858	540	Rawling, John Wray	Wisbeach
1856	524	Rees, Thomas George	Pembroke Dock
1853	294	Rhind, William W.	Berwick
1853	498	Richards, Thomas Lewis	Chester
1856	430	Roberts, Owen	Pwllheli
1857	460	Robinson, John	Woolwich
1853	514	Robinson, William P.	Liverpool
1855	388	Routledge, Henry	London
1855	551	Sanger, William Albert	London
1857	481	Scott, Joseph Robinson	Sheffield
1853	453	Serpell, Samuel	Truro
1857	508	Seymour, George	Oldbury
1853	297	Simpson, Robert	Edinburgh
1858	578	Simpson Henry David	Louth
1853	321	Simpson, Thomas	Walsall
1858	509	Slack, John Lawrence	Ormskirk
1853	268	Speechley, George	Peterborough
1852	413	Stedman, James	Lower Tooting
1856	423	Stewart, James	Kirkcaldy
1858	549	Steward, James	Edinburgh
1853	281	Stoneham, Philip	London

Year of Admission	No. of Certificate.	NAME.	RESIDENCE.
1859	579	Street, Edward	Salisbury
1859	571	Sutton, Charles William	Lincoln
1855	383	Taplin, George	Bath
1850	326	Tasker, William	London
1858	558	Thompson, Charles Henry	Huddersfield
1854	346	Thomson, John	Edinburgh
1857	473	Tieftrunk, Julius	London
1853	333	Todd, Thomas	Edinburgh
1851	144	Towl, Edward	London
1855	466	Tuck, John	Trowbridge
1855	586	Videon, Charles	London
1849	125	Warner, John	London
1853	298	Watson, James	Montrose
1851	415	Watton, Edward	Manchester
1856	562	Waugh, Alexander	Southampton
1858	553	Weller, James William	Bloxwich
1858	529	Weston, Samuel John	Leicester
1857	500	Wigg, Henry John	Lynn
1856	432	Williams, Thomas	Carmarthen
1849	94	Willmott, Edwin	London
1858	566	Wilkinson, George	Manchester
1858	541	Wilson, Charles Wallace	London
1853	572	Young, John	Musselburgh
1859	563	Young, William	Banbury

REGISTERED APPRENTICES.

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Alderson, Frederick H.	Mr. Hempsted	St. Leonards
1857	Allison, Richard R.	Mr. Howorth	Doncaster
1858	Allott, Frederic	Mr. Greaves	Bakewell
1853	Ambrose, John D. L.	Mr. Farmer	Putney
1855	Andrews, Enos	Mr. Cropper	Long Sutton
1857	Appleton, Robert	Mr. Wilson	Sheffield
1857	Argles, Robert	Mr. Deane	Clapham
1853	Aston, George	Mr. Grindley	Chester
1858	Atherton, Charles Isaac	Mr. Bromley	Liverpool
1853	Atkinson, George J.	Mr. Wilson	Harrogate
1858	Atkinson, John P.	Messrs. Hurst & Morton	Louth
1856	Atkinson, Edward F.	Mr. Kirton	Hull
1848	Atton, John T.	Mr. Millns	Spalding
1858	Atwood John Charles	Mr. Cracknell	London
1858	Backhouse, Noah	Mr. Rowntree	London
1858	Badcock, Henry	Mr. Peat	Lymington
1857	Bagshaw, James	Mr. Handley	Wakefield
1857	Baker, Thomas	Messrs. Groves & Son.	Blandford
1859	Bamber, John Kelway	Messrs. Savory & Moore	London
1853	Barber, Tom	Mr. King	Rochester
1854	Barber, William	Mr. Nunn	Bury St. Edmunds
1857	Barlow, John Podmore	Mr. Barlow	Manchester
1856	Barton, Frederick	Mr. Wilson	Bradford
1855	Batchelor, George H. W.	Mr. Watts	Chatham
1856	Bate, Henry	Mr. Davies	Chester
1853	Beach, Thomas C.	Mr. Beach	Bridport
1854	Beach, Wesley	Mr. Beach	Bridport
1855	Beach, Tom Clarke	Messrs. Lea & Co.	Great Malvern
1855	Beaton, Walter	Mr. Beaton	London
1853	Beddard, John	Mr. Cross	Shrewsbury
1859	Bedford, Joseph	Mr. Bolton	Dover
1853	Bell, John	Mr. Sowerby	Carlisle
1857	Bell, James Alfred	Mr. Noakes	Brighton
1857	Bell, William	Mr. Cuthbert	Bedford
1855	Bennington, William	Mr. Mortimer	Sidmouth
1855	Bentley, William J.	Mr. Pryer	Axminster
1859	Berrell, Charles	Mr. Farmer	London
1854	Bingley, Frederick B.	Mr. Tanner	Exeter
1855	Birch, Henry C.	Mr. Clarke	Richmond
1854	Bird, David L.	Mr. Wilson	Canterbury
1854	Bishop, William	Mr. Gay	Stroud
1858	Bland, Percy Owen	Mr. Fox	London
1845	Blaxall, Arthur S.	Mr. Blanchflower	Loddon
1853	Blenkin, Peter S.	Mr. Lofthouse	Hull
1858	Blundell, Joseph A.	Mr. Groves	Weymouth
1850	Blyth, William J.	Mr. Hurworth	York
1856	Bourdas, Isaiah	Mr. Bourdas	London
1859	Bourdas, John	Mr. Bourdas	London
1856	Bowler, Harvey F.	Mr. Hitchcock	Colchester
1854	Bradley, Edwin S.	Mr. Parker	Derby
1858	Bradley, John Perry	Mr. Parker	Birmingham

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Brayshay, Thomas	Mr. Brayshay	Stockton
1857	Brereton, Matthew B.	Mr. Mabson	Yarmouth
1856	Brew, John	Mr. Brew	Brighton
1859	Bridges, Charles William	Mr. Biscoe	London
1856	Brock, George Walter	Mr. Fairbank	Woolwich
1856	Brooks, Saml. Brewer	Mr. Lawton	Wakefield
1853	Brown, Charles B.	Mr. Thorne	Bedford
1855	Brown, William H.	Mr. Corder	North Shields
1856	Brown, George	Mr. Forge	Driffield
1857	Brown, Edward	Mr. Dutton	Birkenhead
1856	Browne, John Edwin	Mr. Bartlett	Chelsea
1853	Burdock, James	Mr. Reading	Warwick
1856	Burt, James	Mr. Allanson	Harrogate
1854	Burton, Joseph	Mr. Wick	Sheffield
1856	Burton, John	Mr. Parker	Derby
1858	Butler, Edward D. B.	Mr. Penney	Poole
1857	Campbell, Robert	Mr. Mackay	Galashiels
1859	Canning, Charles W.	Mr. Keene	Leamington
1858	Capern, Alfred	Mr. Anthony	Bedford
1857	Carre, Louis C. A.	Mr. Tylee	Bath
1855	Carrington, Ebenezer T.	Mr. Toone	Warminster
1859	Carter, Thomas	Mr. Dresser	York
1855	Cartner, David	Mr. Bell	Carlisle
1854	Chambers, William	Mr. Dresser	York
1855	Chapman, Francis C.	Mr. Green	Droitwich
1855	Clarke, Willoughby	Mr. Brown	Oxford
1856	Clarke, Caudell	Mr. Searby	Norwich
1858	Clarkson, Sidney	Mr. Macarthy	Romford
1858	Colby, John	Mr. Colby	Brighton
1857	Cole, Alfred	Mr. Groves	Hammersmith
1858	Collier, William	Mr. Collier	Sheffield
1859	Conder, George	Mr. Smith	Walworth
1855	Cooper, Frederick	Mr. Cooper	Leicester
1859	Cooper, Henry	Mr. White	Nottingham
1853	Cornish, Thomas R.	Mr. Cornish	Penzance
1856	Cornish, William	Mr. Cornish	Brighton
1854	Coulson, Henry	Mr. Coulson	Scarborough
1855	Coulthard, Christopher	Mr. Harrison	Carlisle
1858	Coward, John Senior	Mr. Butler	Pontefract
1854	Cozens, William	Mr. May	Reading
1854	Crease, James R.	Mr. Mackay	Edinburgh
1853	Crussell, James W.	Mr. Cooper	London
1849	Cumpsty, George C.	Mr. Warburton	Bolton
1858	Curtis, Albert Augustus	Mr. Churchouse	Chard
1856	Dallas, Clement	Mr. Gay	Woodbridge
1854	Dalrymple, William	Mr. Luff	Oxford
1858	Davenport, John M.	Mr. Davenport	London
1857	Davies, Robert John	Mr. Roberts	London
1858	Davies, William	Mr. Coleman	Cardiff
1856	Davison, William	Mr. Greaves	Bakewell
1858	Dawson, James Henry	Mr. Telfer	Oxford
1855	Dawson, John	Mr. Goddard	Yarmouth
1855	Dean, Samuel	Mr. Fox	London

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1858	Denne, Henry	Mr. Kingdon	London
1853	Dickins, Benjamin	Mr. Kendall	Stratford-on-Avon
1858	Dodshon, Edward	Mr. Dodshon	Sunderland
1857	Doughty, Edward T.	Mr. Doughty	London
1853	Dowsett, Arthur	Mr. Baker	Chelmsford
1856	Draper, Henry Foulger	Mr. Arnold	Norwich
1858	Dumolo, John Thomas	Mr. Parker	Birmingham
1853	Earland, William	Mr. Davies	Hay
1856	Eason, John	Mr. Gilkes	Leominster
1858	Eastman, Jabez	Mr. Clark	Hackney
1857	Edwards, Frederick H.	Mr. Medcalf	Lower Tooting
1854	Eland, Edward F.	Mr. Telfer	Oxford
1853	Elliott, Robert	Mr. Steward	Yarmouth
1859	Elliott, Robert	Messrs. Proctor & Son	Newcastle
1859	Ellis, Henry Brook	Mr. Collins	Bristol
1849	Else, William	Mr. Jones	Derby
1856	Eminson, John	Mr. Marshall	Gainsborough
1853	Evans, William	Mr. Ferris	Bristol
1857	Evans, Alfred Paget	Mr. Cutting	Leamington
1853	Evans, Edward	Mr. Bancroft	Ruthin
1857	Eve, Charles	Mr. Wilson	Holloway
1854	Fairley, Robert	Mr. Mackay	Edinburgh
1856	Farrar, William	Mr. Heming	Sunderland
1854	Fidel, Albert J	Mr. Telfer	Oxford
1853	Fielder, Henry Thomas	Mr. Fielder	Warminster
1845	Flood, William W.	Mr. Goodman	Exeter
1857	Foggitt, Thomas	Mr. Smeeton	Leeds
1852	Foster, Michael E.	Mr. Sturton	Peterborough
1854	Foster, Thomas U.	Mr. Weston	Sleaford
1856	Fox, Edward M.	Mr. Michell	Falmouth
1853	Fresson, William	Mr. Fresson	Stevenage
1858	Fuller, Thomas G.	Mr. Fuller	Burntisland, N.B.
1846	George, Henry	Mr. Davis	Leominster
1853	Gething, William	Mr. Tomlinson	Lincoln
1857	Gibbs, Thomas	Mr. Steward	Yarmouth
1858	Giddings, Wm. H. C.	Mr. Stocken	London
1851	Gilliatt, William	Mr. Gamble	Grantham
1859	Gillies, Wm. Jonathan	Mr. Dunn	St. Austell
1855	Goodchild, Nathaniel	Mr. Wood	Brighton
1859	Goodwin, Medmer	Mr. Telfer	Oxford
1855	Goodwyn, Charles S.	Mr. Chapman	Ipswich
1853	Graham, Ralph	Mr. Fairweather	Newcastle
1859	Greaves, Wm. Samuel	Mr. Greaves	Ironville
1858	Greig, Francis	Mr. Mackay	Edinburgh
1851	Green, Robert	Mr. Knott	Exeter
1855	Gregory, Richard	Mr. Lavers	London
1855	Grigor, William	Mr. Macfarlan	Edinburgh
1853	Gunn, Frederick T.	Mr. Cross	Shrewsbury
1859	Hadley, Thomas	Mr. Harris	Hereford
1856	Hall, Thomas H.	Mr. Hall	Southampton
1856	Halsey, Bennet	Mr. Husband	Exeter
1854	Ham, Charles	Mr. Foster	Collumpton
1852	Hampson, Thomas	Mr. Woolley	Manchester
1854	Harley, Edward	Mr. Foster	Ludlow
1858	Harper, Wm. James.	Mr. Gent	Macclesfield

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1856	Harrison, Stephen	Mr. Breary	Douglas
1853	Haslam, Frederick B.	Mr. Dakin	Poplar
1858	Hasselby, Thomas J.	Mr. Chantry	Goole
1856	Hatch, Richard M.	Mr. James	Bognor
1857	Hatchard, Stephen	Mr. Huggins	Alresford
1859	Hatchett, Thomas	Mr. Hemingway	London
1856	Head, John T.	Mr. Head	Lewes
1857	Heald, Alfred John	Mr. Barley	Wisbeach
1853	Heanly, Marshall	Mr. Babbington	Peterborough
1850	Heap, Edward	Mr. Wylde	Manchester
1853	Herbert, Henry	Mr. Groves	Blandford
1857	Highway, Matthew H.	Mr. Caddick	Newcastle-u.-Lyne
1843	Hill, William	Mr. Rowe	Plymouth
1851	Hill, William R.	Mr. Tylee	Bath
1856	Hill, William	Mr. Gardner	Edinburgh
1857	Hill, Francis	Mr. Reinhardt	Leeds
1857	Hoare, James Roper	Mr. Gigner	Chelsea
1852	Hodgkinson, John S.	Mr. Brooker	Macclesfield
1859	Holgate, Walter	Mr. Barber	Liverpool
1856	Holland, William	Mr. Sibary	Longton
1852	Holliday, Joseph	Mr. Wilding	Liverpool
1859	Holmes, John Thomas	Mr. Botham	Manchester
1857	Holmes, William C.	Mr. Stocken	London
1855	Holmwood, William C.	Mr. Coppock	Bridport
1855	Holt, George F. W.	Mr. Obbinson	Sleaford
1856	Holt, William Henry	Mr. Paulden	Altrincham
1858	Hopgood, Rich. Cooper.	Mr. Hopgood	Chipping Norton
1854	Horn, William	Mr. Longrigg	Appleby
1853	Huggins, Richard	Mr. Tanner	Exeter
1856	Hughes, Evan	Mr. Deane	Clapham
1858	Hughes, Griffith Hugh.	Mr. Hughes	Holyhead
1854	Humphries, Henry A.	Mr. Grounds	Ludlow
1852	Hunter, George	Mr. Garbutt	Gateshead
1853	Hustwick, Thomas H.	Mr. Coupland	Harrogate
1857	Iliffe, Frank	Mr. Brown	Coventry
1843	Ince, Joseph	Mr. Ince	London
1859	Isherwood, James	Mr. Greenwell	London
1858	Ive, William	Mr. Lawrence	Kensington
1856	Jackson, Warwick	Mr. Hitchcock	Colchester
1856	Jackson, John	Messrs. Wilson & Co.	Bradford
1853	Jacob, John R.	Mr. Bowers	Chester
1855	Jakins, George S.	Mr. Golding	London
1853	James, Robert	Mr. Fletcher	Nottingham
1853	Jones, Charles W.	Mr. Jones	Carmarthen
1853	Jones, Richard L.	Mr. Jones	Narberth
1859	Jones, Jas. Davenport.	Mr. Marston	Ludlow
1855	Keene, John.	Mr. Savage	Brighton
1856	Kemp, Francis	Mr. Smeeton	Leeds
1856	Kent, Frederick W.	Mr. Randall	Southampton
1854	Knight, John A.	Mr. Arnold	Norwich
1858	Knowles, John Hiles	Mr. Anthony	Bedford
1857	Lacey, Walter	Mr. Meredith	Bristol
1855	Lamplough, John	Mr. Stevenson	Derby
1857	Langley, William	Mr. Tylee	Bath

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1857	Lavers, Thomas F.	Mr. Lavers	Lewisham
1853	Lawrence, George	Mr. Wright	London
1856	Lawrence, Henry	Mr. Watkins	Stratford
1851	Lees, James	Mr. Clarke	Richmond
1853	Le Feuvre, Francis	Mr. Ereaut	Jersey
1858	Leppard, James	Mr. Williams	Horsham
1853	Long, Alfred	Mr. Noakes	Brighton
1857	Lovatt, John Hammond.	Mr. Wilshaw	Wordsley
1859	Lucas, Philip John	Mr. Martin	Guildford
1858	MacGeorge, William	Mr. Carruthers	Dumfries
1857	Machon, Edward	Mr. Parkes	Manchester
1855	Malin, Edmund C. M.	Mr. Huggins	Barnet
1859	Manby, Thomas	Mr. Chenery	Ipswich
1850	Manthorp, George	Mr. Manthorp	Colchester
1847	Marrack, George M.	Mr. Searle	Crediton
1852	Marrack, Philip	Mr. Searle	Crediton
1853	Marston, Alfred	Mr. Cocking	Ludlow
1856	Martin, James	Mr. Palk	Southampton
1857	Martin, Benjamin	Mr. Handley	Wakefield
1857	Mason, John	Mr. Mason	Hastings
1857	Mathias, Thomas	Mr. Jones	Narberth
1853	Matthews, Charles	Mr. Gostling	Diss
1853	Maudsley, William	Mr. Barnes	Preston
1858	Maudson, Joseph W.	Mr. Maunder	Sheffield
1855	May, Augustus S.	Mr. Greenwell	London
1855	McCabe, Dunbar	Mr. Macfarlan	Edinburgh
1859	Merrick, Charles Jas.	Mr. Bateman	Manchester
1857	Midgley, John James	Mr. Reinhardt	Hull
1858	Midgley, Charles	Mr. Rimmington	Bradford, York
1858	Midgley, J. E.	Messrs. Lynch & Wilkinson.	Manchester
1856	Miller, Duncan S.	Mr. Pooley	Bath
1856	Mohun, Martin	Messrs. Argles & Co.	Maidstone
1856	Monger, Hamilton S.	Mr. Gay	Stroud
1858	Monkhouse, Joshua	Mr. Davies	Gainsbrough
1857	Moore, Abraham	Mr. White	Birmingham
1856	Morley, Edward	Mr. Asling	Spalding
1856	Morley, George	Mr. Wheeler	Hackney
1859	Moysey, William	Mr. Moon	Ilfracombe
1853	Moverley, Robert	Mr. Dingley	Maidstone
1857	Murrell, John Friday	Mr. Maynard	Brandon
1856	Newby, John	Mr. Hughes	Altrincham
1855	Norrish, James	Mr. Searle	Crediton
1858	Olliver, George E.	Mr. Groves	Weymouth
1847	Orpe, Thomas M.	Mr. Watton	Derby
1857	Orton, Thomas J.	Mr. Iliffe	Nuneaton
1849	Ough, William	Mr. Jeffery	Devonport
1856	Overton, William	Mr. Fowke	Stafford
1847	Owen, Thomas R.	Mr. Mease	North Shields
1852	Owles, James	Mr. Owles	Yarmouth
1858	Parry, William	Mr. Christopher	Crickhowell
1859	Pasmore, Fred. Rich.	Mr. Pasmore	Chelsea
1855	Paxton, William M.	Mr. Mitchell	London
1853	Peacock, Hamerton	Mr. Peacock	London
1853	Pearce, Henry T.	Mr. Pearce	Gloucester

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1858	Pearcey, Herbert A.	Mr. Biggs	London
1858	Pertwee, Frederick	Messrs. Fincham	London
1853	Phillips, John Dutton	Mr. Dennison	Dudley
1858	Phillips, Jonathan	Mr. Christian	Godalming
1859	Philpot, Arthur Walter	Mr. Wimble	Maidstone
1859	Picton, John T.	Messrs. Picton & Hatton	Warrington
1858	Pickup, Robt. Lansdale	Mr. Pickup	Manchester
1858	Pissey, William F.	Mr. Pissey	Rayleigh
1857	Pistrucci, Filippo	Mr. King	London
1855	Pitman, John	Mr. Fendick	Bristol
1859	Postans, Arthur Wm.	Mr. Banfield	Bury St. Edmunds
1855	Potts, Robert A.	Mr. Potts	London
1854	Power, Thomas M.	Mr. Williams	Nottingham
1858	Pratt, Henry	Mr. Loggin	Stratford-on-Avon
1857	Price, Thomas	Mr. Laen	Pembroke Dock
1857	Pritchard, George F.	Mr. Barnes	Knightsbridge
1857	Prust, Richard	Mr. Brend	Swansea
1858	Pryce, Alfred C.	Messrs. Picton & Hatton	Warrington
1858	Pullin, William H.	Mr. Parkes	Atherstone
1853	Quinlan, Joseph	Mr. Times	London
1853	Radermacher, George	Mr. Bartlett	Chelsea
1855	Rae, John Inglis	Mr. Mackay	Edinburgh
1858	Rainnie, Alexander	Mr. Stewart	Edinburgh
1858	Rayner, Gilmour G.	Mr. Brend	Swansea
1856	Rea, James Parker	Mr. Rea	London
1857	Reed, Alfred	Mr. Gordelier	Sittingbourne
1854	Reeves, Robert	Mr. Gordelier	Sittingbourne
1857	Renaud, Monchery	Mr. Deane	Clapham
1856	Reynolds, Freshfield	Mr. Martin	Guildford
1852	Riley, James	Mr. Smith	Sutton Coldfield
1858	Ritchie, John Moffat	Mr. Medley	Derby
1852	Rivers, Henry	Mr. Hornsby	Odiham
1856	Roberts, John L.	Mr. Sibary	Longton
1859	Roberts, Charles	Mr. Handley	Wakefield
1859	Robertson, A. G.	Messrs. Macfarlan & Co.	Edinburgh
1857	Robinson, James F.	Messrs. Picton & Hatton	Warrington
1859	Rochford, Percy	Mr. Burden	London
1858	Romans, Thomas	Mr. Cutting	Selby
1856	Rosselloty, John C.	Mr. Couch	Islington
1850	Roulston, Benjamin W.	Mr. Chantry	Goole
1857	Rowell, Joseph	Messrs. Sturton & Son	Peterborough
1853	Rubbra, Frank	Mr. Hope	Wellingborough
1853	Salmon, Henry L.	Mr. Moore	Brighton
1857	Savage, W. Wallace	Mr. Savage	Brighton
1859	Savage, George Henry	Mr. Savage	Brighton
1846	Savory, Thomas H.	Mr. Savory	London
1846	Savory, Charles H.	Mr. Savory	London
1854	Saxby, Henry	Mr. Saxby	Lewes
1853	Say, Edmond H.	Mr. Cooke	Norwich
1855	Scarlin, James H.	Mr. Marchant	Ipswich
1857	Scott, James Furness	Mr. Smith	Dunstable
1859	Scruby, William Yull	Mr. Pertwee	Romford
1857	Seaton, Charles A.	Mr. Hill	Sherborne
1859	Shadford, Thomas	Mr. Shadford	Spalding

Date of Registration	NAME.	RESIDING WITH.	TOWN.
1855	Shaw, Ward	Mr. Lofthouse	Hull
1858	Shaw, Benjamin	Mr. Gissing	Wakefield
1845	Shepheard, Thomas	Mr. Gulliver	Lutterworth
1854	Shepley, Samuel	Mr. Claughton	Chesterfield
1857	Sheriff, Thomas	Mr. Macfarlan	Edinburgh
1855	Simpson, Thomas	Mr. Allen	Boston
1859	Simpson, A. Lankester	Mr. Simpson	Stowmarket
1854	Slater, Henry	Mr. Asling	Spalding
1856	Slator, Thomas	Mr. Pilley	Boston
1856	Smart, Benjamin	Messrs. Lea and Co.	Worcester
1852	Smith, Edward	Mr. Lynch	Manchester
1852	Smith, William	Mr. Sumner	Birmingham
1853	Smith, Frank de Carle	Mr. Wright	London
1854	Smith, Frederick	Mr. Foster	Ludlow
1844	Smith, James W.	Mr. Coulson	Scarborough
1859	Smith, George Henry	Mr. Tonge	York
1859	Smith, Hubert	Mr. Luff	Oxford
1858	Soole, Seymour Henry	Mr. Jessopp	Bishop Stortford
1855	Spearing, James	Mr. Dowman	Southampton
1858	Stanley, Robert Swan	Mr. Wortley	Durham
1854	Stanway, William H.	Mr. Blandford	London
1857	Stapleton, Thos. Glode.	Mr. Collins	London
1856	Stokes, Edward H.	Messrs. Lea and Co.	Malvern
1859	Stokes, Walter Edw.	Mr. Boully	London
1857	Stone, George	Mr. Tonge	York
1858	Stretton, Charles	Mr. Parker	Derby
1853	Sturges, William T.	Mr. Gudgen	Kimbolton
1855	Sturton, John R.	Mr. Sturton	Peterborough
1857	Swinnerton, William	Mr. Woods	Worcester
1857	Syer, John Witham	Mr. King	Soham
1857	Symes, Charles	Mr. Ellis	Thornbury
1856	Tanner, Augustus F.	Mr. Dickinson	London
1853	Taylor, Samuel	Mr. Tonge	York
1857	Taylor, George Spratt	Mr. Coupland	Harrogate
1853	Teasdale, Thomas	Mr. Myers	Newcastle
1855	Teed, David	Mr. Pasmore	Exeter
1854	Thomas, George S.	Mr. Outhwaite	Bradford
1856	Thomson, Denzil	Mr. Witherington	Worcester
1858	Thomson, George G.	Messrs. Macfarlan	Edinburgh
1858	Tilden, William A.	Mr. Allchin	London
1858	Tolbert, Thos. W. H.	Mr. Froud	Dorchester
1857	Touzeau, James Fred.	Mr. Arnold	Guernsey
1857	Touzeau, John Arnold	Mr. Arnold	Guernsey
1856	Towerzey, Alfred G.	Mr. Towerzey	London
1857	Trewavas, Richard J.	Mr. Job	Truro
1856	Trotter, Joseph	Mr. Brown	York
1857	Truman, George F.	Mr. Wellington	Oakham
1853	Turner, John	Mr. Payne	Aylesbury
1856	Twinberrow, James K.	Mr. Twinberrow	London
1858	Umney, Charles	Mr. Corrie	Bedford
1855	Underdown, Fred. W.	Mr. Hall	Canterbury
1859	Vacher, A.	Messrs. Bullock & Reynolds	London
1855	Vooght, William	Mr. Twinberrow	London
1846	Wakefield, Cecil H.	Messrs. Lea & Co	Worcester
1849	Walker, Charles	Mr. Walker	Hogsthorpe

Date of Registration.	NAME.	RESIDING WITH.	TOWN.
1854	Walker, Joseph	Mr. Witherington	Worcester
1857	Walker, George	Mr. Goodall	Derby
1859	Walker, William	Mr. Headley	Bridlington Quay
1857	Wall, John Thomas	Mr. Butcher	Cheltenham
1853	Walls, Thomas	Mr. Barber	Liverpool
1856	Walsh, Edward	Mr. Argles	Maidstone
1852	Walters, William	Mr. Tanner	Exeter
1855	Walton, Ralph	Mr. Ritson	Sunderland
1846	Warner, George T.	Mr. Williams	Nottingham
1857	Warren, Thomas P. B.	Mr. Pasmore	Exeter
1858	Waters, Alexander	Mr. Corrie	Bedford
1852	Watson, James B.	Mr. Fitt	Barking
1853	Watson, William	Mr. Chapman	Ipswich
1857	Watson, Richard T.	Mr. Dobinson	Bishopwearmouth
1857	Watson, Thomas D.	Messrs. Martindale & Son	Carlisle
1857	Watts, John Newton	Mr. Watts	London
1857	Webber, Charles F.	Mr. Edwards	Sidmouth
1859	Webster, George O	Mr. Seddon	Manchester
1858	Webster, George W.	Mr. Webster	Warrington
1850	Wells, Edwin	Mr. Grounds	Ludlow
1853	Wheeler, James	Mr. Payne	Aylesbury
1855	Wheeler, Joseph	Mr. Owen	London
1856	White, John G.	Mr. Ransome	Hitchin
1856	White, James W.	Mr. Iverach	Kirkwall
1856	Whitehouse, George H.	Mr. Tonge	York
1857	Wigginton, Joseph	Mr. White	Nottingham
1858	Willan, James R.	Mr. Pratt	Wolverhampton
1850	Willcox, John	Mr. Hollier	Dudley
1853	Williams, Frederick	Mr. Anderson	Worcester
1856	Willsher, Stephen Henry	Mr. Bolton	Tenterden
1852	Wilson, William	Mr. Rainey	Spilsby
1859	Wilson, Frederick	Mr. Lord	Rochdale
1856	Witherington, Henry	Mr. Witherington	Worcester
1853	Wood, Edmund	Mr. Pooley	Bath
1854	Wood, John Robert	Mr. Simmonds	Boston
1857	Wood, Albert	Mr. Watkins	Walsall
1858	Wootton, Alfred C.	Mr. Wootton	Luton
1858	Wyman, John	Mr. Gulliver	Lutterworth
1855	Yerworth, Edmund	Mr. Binge	Pimlico
1857	Young, John	Mr. Mackay	Galashiels

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. II.—AUGUST 1st, 1859.

THE JACOB BELL MEMORIAL.

Those who have witnessed the disinterested sacrifices and exertions which were made by the late Mr. Jacob Bell in furthering the objects of the Pharmaceutical Society, feel that the great value of the services thus rendered call for some marked recognition, and that the gratitude of those for whose benefit such services were bestowed should be expressed in the form of a memorial which shall permanently connect the name of Jacob Bell with the institution he so largely contributed to establish. The proposition for founding scholarships to be called "the Jacob Bell Memorial Pharmaceutical Scholarships," emanated simultaneously from several sources, and seemed to be unanimously approved of by those to whom it was made. The only questions that arose had reference to the mode of carrying out the object, and to the means required for its accomplishment. The Council of the Pharmaceutical Society at once gave their sanction to the proposition, and steps have been taken for raising a fund by subscription, which it is hoped will justify the anticipations of the warmest promoters of the undertaking. The Committee to whom the subject was referred have recommended that there shall be two classes of scholarships, and, as each scholarship would probably be of the value of £30 or £40 a year, it is obvious that a large sum will be required to give effect to this recommendation. When, however, it is considered for whom this memorial is to be established, and who are the parties to whom the appeal is made for the means of establishing it, there can be no doubt of the liberal spirit in which it will be responded to. It shall not surely be said of the members of the Pharmaceutical body that they are insensible to the merits and claims of their late distinguished member, who, although born to wealth, endowed with natural abilities which enabled him to excel in any pursuits in which he engaged, qualified by education and enabled by inheritance to take a high position among those engaged in the practice of Pharmacy, nevertheless made common cause with his less favoured brethren, became their unpaid advocate, nay, expended his means in furthering their interests, and, disregarding the advantages of his own professional position, sought to lessen the disparity existing between himself and others by elevating all to the higher standard of qualification. His was a noble sacrifice of personal advantages in promoting the general advancement of the body to which he belonged; and the members of this body have now an opportunity for making a graceful acknowledgment of their high appreciation of the valuable services which have been rendered by Mr. Bell, and at the same time of furthering one of the principal objects for which he laboured so long and so ardently.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*Continued*).

ELECTED IN JULY.

MEMBERS.

WARWICK.....Baly, James
DUBLIN.....Ellwood, William
PRESTON.....Houghton, William

MAJOR EXAMINATION, 19*th July*.

Cook, William.....Grantham
Green, Conrad Samuel.....Stratford-on-Avon
Perrot, Pierre Bénoni .....Mauritius
Street, Edward.....Salisbury

MINOR EXAMINATION.

Bothamley Valentine.....Newark
Hall, Thomas Howard .....Southampton
King, James .....Bristol
Long, Alfred Thorby.....Brighton
Monger, Hamilton Stacey .....Stroud
Powers, Edward..... .....Stourbridge

REGISTERED APPRENTICES.

NAME.	RESIDING WITH	ADDRESS.
Earnshaw, Benjamin King	Messrs. Garratt.....	Rugby
Hudson, John William.....	Mr. Pratt.....	Bradford
Jones, John Reed.....	Messrs. Garratt.....	Rugby
Richardson, Richard	Messrs. Carruthers & Allan...	Dumfries
Warland, Francis William.....	Mr. Penney.....	Pool

MAJOR EXAMINATION, *July 26th*.

Barnes, Edwin.....Durham
Davies, David.....Cardigan
Ereaut, John.....Jersey
Fleetwood, Thomas.....Stratford-on-Avon

MINOR EXAMINATION.

Allen, James Hore..... .....Barnstaple
Mathew, John Alfred .....Cape Town

AT A MEETING OF THE COUNCIL, 6*th July*, 1859,

Present—Messrs. Bird, Bucklee, Cupiss, Davenport, Deane, George Edwards, J. B. Edwards, Hollier, Macfarlan, Meggeson, Morson, Sandford, Squire, Standring, and Waugh.

DEATH OF THE PRESIDENT.

"The Council of the Pharmaceutical Society, on this its first meeting after the death of its President, Mr. Jacob Bell, desires to record its grateful sense of the invaluable services rendered by him to this Society, from its earliest commencement to the day of his death, and of the total self-abnegation in which those services were ever given. In order to give permanence to this expression of gratitude:—

Resolved—"That a Committee be appointed to take the requisite steps for forming a Capital Fund, out of which one or more Scholarships, bearing the name of Jacob Bell, may be established in connexion with the Society."

Resolved—"That the following be appointed a Committee for carrying out the preliminary arrangements connected with the above resolution:—President, Vice-President, and Treasurer; Messrs. Deane, G. Edwards, Lescher, Sandford, Squire, and Waugh, with power to add to their number; and that they report to a Special Meeting of the Council."

BEQUEST FROM THE LATE PRESIDENT TO THE PHARMACEUTICAL SOCIETY.

"25, *Cavendish Square, W.*, 20*th June*, 1859.

"GENTLEMEN,—By the direction of Mr. James Bell and Mr. Thomas Hyde Hills, the executors of the late Mr. Jacob Bell, I forward to you an extract of his will, whereby the sum of £2000 is bequeathed to the Trustees of the Pharmaceutical Society.

"I have the honour to be, Gentlemen,

"Your very obedient Servant,

"GEO. BRACE.

"*To the Council of the Pharmaceutical Society of Great Britain.*"

Extract of the Will of Jacob Bell, Esq., deceased, late of No. 15, *Langham Place, and No.* 338, *Oxford Street.*

"I give and bequeath the sum of Two Thousand Pounds to the Trustees for the time being of the Pharmaceutical Society of Great Britain, which Two Thousand Pounds are to be paid exclusively and in priority to other legacies out of such part of my Personal Estate as is by law applicable to such payment, and to be expended in establishing or otherwise increasing the efficiency of a School of Pharmacy, or in promoting Pharmaceutical Education, in such manner as the Council of the said Society may deem expedient, but so that the receipts of the Trustees shall be good discharges to my Executors."

Executors { JAMES BELL, Esq., 1, *Devonshire Place, Marylebone*, and THOMAS HYDE HILLS, Esq., 15, *Langham Place, Marylebone.*

It was moved by Mr. STANDRING, seconded by Mr. CUPISS, and

Resolved—"That the Council gratefully acknowledge the announcement of the bequest of £2000 by their late highly respected President, Mr. Jacob Bell, to the Pharmaceutical Society, and pledge themselves faithfully to carry out his expressed wishes in the disposition thereof, to the best of their ability."

ELECTION OF PRESIDENT AND MEMBER OF COUNCIL.

IN consequence of the death of Mr. Jacob Bell, the Council declared a vacancy in the office of President and one Member of Council.

The election for the office of President having been taken by ballot, was declared to have fallen on Mr. T. N. R. Morson.

In the same manner Mr. Adolphus F. Haselden, of 18, Conduit Street, was elected to fill the vacancy in the Council.

The office of Vice-President was declared to be vacant; the election to take place at the next meeting of Council, in accordance with the bye-laws.

AT A SPECIAL MEETING OF THE COUNCIL, 20*th July*, 1859,

Present—Messrs. Bird, Davenport, Deane, Hanbury, Haselden, Meggeson, Morson, Sandford, Squire, and Waugh,

The election for the office of VICE-PRESIDENT having been taken by ballot, was declared to have fallen on Mr. Squire.

The following Report was presented:—

The Committee appointed to consider the preliminary steps to be taken for carrying out the proposed establishment of Pharmaceutical Scholarships as a Memorial of the late Mr. Jacob Bell, report,—

1. That they deem it desirable, if the amount subscribed be sufficient, to establish two or more scholarships, to be in the gift of the Council of the Pharmaceutical Society for the time being.

2. That they recommend that one or more of these scholarships be open to Registered Apprentices and Associates of the Society who are under 21 years of age, and who shall be considered to have established their claim thereto by capability, industry, and general good conduct; and that in addition to these there be others of a higher grade to be offered, with the view of encouraging the further prosecution of scientific study, to Associates under 24 years of age who have passed the major examination.

3. That they propose the following form of circular to be sent to the Members, Associates, and Registered Apprentices of the Society:—

CIRCULAR.

"Many Members of the Pharmaceutical Society and friends of the late Mr. Jacob Bell having expressed a desire that some Monument or Testimonial should be erected to the memory of their late President and friend, as a proof of their high estimation of his disinterested exertions in promoting the advancement of Pharmaceutical knowledge, thereby elevating those engaged in the practice of Pharmacy to the social position occupied by their brethren in other countries, and also his activity in defending them from injurious legislation, the Council have resolved, that no more appropriate mode of accomplishing this object, nor one more in accordance with the expressed opinions and wishes of the man they desire to honour, could be adopted than the establishment, by a general subscription, of Pharmaceutical scholarships, to be called 'The Bell Memorial Pharmaceutical Scholarships,' which shall be awarded under suitable regulations, to industrious, well-conducted, and competent Registered Apprentices and Associates of the Pharmaceutical Society.

"The details, including the extent of the proposed Scholarships, and the conditions on which they shall be awarded, must necessarily depend on the amount of subscriptions obtained, but the Council feel assured that such a sum will be subscribed as will enable them to establish not only minor scholarships for young men less favoured by fortune than by industry, but also one at least for the advancement of high scientific attainments, so that there may thus be two classes of scholarships tending to advance the reputation and dignity of the Pharmaceutical Society."

Resolved—"That the Report now read be approved and adopted."

Resolved—"That the Secretary be instructed to issue the Circular to the Members, Associates, and Registered Apprentices of the Society, and to advertise the same in the *Times*, *Daily News*, *Post*, *Star*, *Telegraph*, *Standard*, *Lancet*, *Medical Times*, and *Marylebone Mercury*."

Resolved—"That Subscriptions be received by the Secretary, Mr. Bremridge, 17, Bloomsbury Square, and that the Local Secretaries be requested to lend their valuable assistance, and to receive subscriptions. That Mr. Hanbury be requested to act as Treasurer, that the money as received be paid over to him, and that the first list of subscriptions be published in the August number of the Journal."

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL.

	£	s.	d.
Andrews, John Betts, Clare	1	1	0
Anthony, John Lilley, Bedford	1	1	0
Ball, G. V., Banbury	1	1	0
Ballard, Edwin, Farringdon	1	1	0
Barnard, John, Clapham Road	5	5	0
Bennett, George, Blandford	1	1	0
Bentley, Professor, 17, Bloomsbury Square	5	5	0
Binge, Thomas, Pimlico	1	1	0
Bird, Augustus, 22, High Street, Kensington	5	5	0
Bird, William L., 42, Castle Street, Oxford Street	5	5	0

	£	s.	d.
Bottle, Alexander, Dover	5	5	0
Brady, Henry B., Newcastle	1	1	0
Bremridge, Elias, 17, Bloomsbury Square	5	5	0
Bucklee, Wm. H., 86, New Bond Street	5	5	0
Churchill, John, 11, New Burlington Street	10	10	0
Cockton, John, Maryport	1	1	0
Daines, Thomas, London	1	1	0
Darby, Stephen, 140, Leadenhall Street	5	5	0
Davenport, John T., 33, Great Russell Street	5	5	0
Davis, John Oliver, Folkestone	1	1	0
Deane, Henry, Clapham	5	5	0
Gale, Samuel, 338, Oxford Street	2	2	0
Garle, John, 12, Kensington Terrace	5	5	0
Graham, Thomas, F.R.S., Master of the Mint	5	5	0
Groves, Henry, Weymouth	1	1	0
Hammon, Richard, Folkestone	1	1	0
Hanbury, Daniel Bell, Plough Court	21	0	0
Haselden, Adolphus F., 18, Conduit Street	5	5	0
Hills, Thomas Hyde, 338, Oxford Street	105	0	0
Hooper, William, Covent Garden	5	5	0
Jenner, William M., Folkestone	1	1	0
Kernot, George C., 2, Chrisp Street, Poplar	1	1	0
Macfarlan, John F., Edinburgh	5	5	0
Machray, William, 338, Oxford Street	1	1	0
Mawson, John, Newcastle	1	1	0
Meggeson, George, 61, Cannon Street	5	5	0
Middleton, Francis, 338, Oxford Street	2	2	0
Morson, Thomas N. R., 38, Queen's Square	21	0	0
Nicholson, John Joseph, Sunderland	1	1	0
Orridge, Benjamin B., 30, Bucklersbury	10	10	0
Paine, Standen, Brighton	1	1	0
Palk, Edward, Southampton	1	1	0
Palmer, Robert, 33, Wilton Place, Belgrave Square	5	5	0
Pollock, Thomas, 129, Fenchurch Street	3	3	0
Proctor, Bernard S., Newcastle	1	1	0
Proctor, William, Newcastle	1	1	0
Redwood, Dr., 17, Bloomsbury Square	5	5	0
Russell, Charles L., Windsor	1	1	0
Sandford, George W., 47, Piccadilly	5	5	0
Seaton, Charles, Sherborne	1	1	0
Smeeton and Son, Leeds	5	5	0
Squire, Peter, 277, Oxford Street	21	0	0
Veitch, William, Sheldon	1	0	0
Waugh, George, 177, Regent Street	21	0	0
Waugh, Alexander, 177, Regent Street	5	5	0
Weston, Charles, Lincoln	1	1	0
Wigg, Henry John, Lynn	1	1	0

NORTH BRITISH BRANCH.

COUNCIL MEETING IN EDINBURGH.

THERE was a special meeting of Council held in the Society's rooms, George Street, Edinburgh, on Tuesday forenoon, June 28th. The President having taken the chair, the following Minute was unanimously agreed to:—

"The Council, and as representing the Pharmaceutical Society throughout Scotland, hereby record their deep and heartfelt regret for the loss sustained by the death of Jacob Bell, Esq., President of the Society in London. No mere words can express the depth of sadness and sorrow which filled the hearts of all on the announcement of his death.

"For full twenty years he has lived in the affections of many, while his constant, unwearied, and successful efforts on behalf of Pharmacy can never be fully estimated. Time, fortune, talents, and labour were all freely devoted to the well-being and improvement of his profession, while no sacrifice was ever considered too great, when by his personal exertions he could prove of service in the cause with which he had truly bound up his very existence.

"The present generation of Pharmaceutists owe Mr. Bell much, while all cannot but feel a debt of gratitude to him as the founder of the Society, which succeeding years will only tend to strengthen and increase, as the full benefit of Mr. Bell's untiring exertions becomes known and appreciated.

"At such a time, and while the leading journals throughout the kingdom are teeming with notices of this highly gifted and esteemed individual, the present meeting feel that it would be entirely out of place to say much in thus recording the great loss, which not only their own Association but society at large have sustained; and yet they cannot allow such a sad event to pass without giving this expression of their intense regret at Mr. Bell's early death. Many fond recollections crowd upon the minds of some of those now present, and they feel it is not too much to say, that few men have ever died so much respected and so universally regretted as Mr. Jacob Bell. Highly honourable, benevolent, intellectual, and truly good, Mr. Bell has left an example which all may strive to emulate, but few, very few, may ever expect to attain.

"The Council feel it is not their province, in these short and circumscribed remarks, to refer to the high position which Mr. Bell occupied in the literary as well as in the scientific world, and can only in conclusion resolve that a copy of this Minute be transmitted to the surviving members of Mr. Bell's family, as an expression of sympathy, accompanied with every respectful and sincere feeling of condolence on this melancholy occasion."

The PRESIDENT proposed, and the VICE-PRESIDENT seconded, "That the thanks of the meeting be given to Mr. John Mackay for having summoned the Council on this occasion, and giving the Members of it an opportunity of unanimously adopting the foregoing resolution."

The meeting thereafter adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, June 23rd, 1859.

THIS being the last meeting of the session, the Council determined that a general conversazione should be held, in consequence of which tickets were issued to all the members, each ticket admitting a lady or gentleman in addition to the member. The company began to arrive about half-past six P.M., and continued to do so until eight o'clock, at which hour about 150 were present. The whole of the rooms of the Royal Institution, including the Gallery of Art and Museum of Applied Science, were thrown open for promenade, and the numerous and valuable collection of objects of natural history and works of art were viewed and examined with great interest. A number of the members of the Microscopic Society had kindly accepted invitations to the meeting, and several of them brought their microscopes in addition to those belonging to the members of the Association, and exhibited some very interesting micro-photographs and numerous very beautiful objects belonging both to the organic and inorganic kingdoms, and through the kindness and liberality of a number of the members and friends, an excellent assortment of the stereoscopes and views were exhibited; also a large solar camera was placed on the table, with portraits, taken size of life. Some very beautiful specimens of photographic art were

also on view; these, from their highly-finished character, commanded general admiration.

At eight o'clock tea and coffee were served in the library, after which the company adjourned to the large lecture room, where Dr. Edwards delivered a short address on the relation between Magnetic, Voltaic, and Statical Electric Phenomena, illustrated by a powerful Rumkorff's induction coil and battery. He also exhibited the brilliant phenomena of electrical discharges in vacuous tubes containing highly rarefied gases, &c., illustrating the peculiar stratifications which the light undergoes when traversing rarefied media. The address was listened to with great interest, and the illustrations, from their brilliant and successful character, elicited repeated rounds of applause. Dr. Edwards also exhibited the combustion of hydrogen gas by means of an argand burner surmounted by a platinum cage.

In bringing the business of the meeting to a close, the President, after thanking Dr. Edwards and the numerous other gentlemen who had so materially contributed to the enjoyment of the evening by bringing forward so many brilliant and novel objects of interest, reminded the meeting that exactly ten years ago the Association was inaugurated by a meeting, held on the 22nd June, 1849, and they were now engaged in bringing to a very successful termination the tenth session. It would be gratifying to all present to learn that this tenth session had been more successful than any previous session; for, while they were less dependent upon extraneous aid for lectures at their ordinary meetings, the true objects of the Association were becoming more appreciated, and a greater desire evidenced by members to bring forward interesting and important topics for discussion. But while congratulating themselves upon this result, they were painfully reminded that the meeting of 1849 resulted out of resolutions arrived at in a former meeting of the whole profession of the town, which was convened and enlightened by one who, alas! had been so recently removed from amongst them—by one whose philanthropy and earnest zeal in the cause of human progress generally, but especially in the cause of Pharmacy, warmed them into enthusiasm, and had been the basis alike of whatever success had attended their labours or those of the Pharmaceutical Society in London. That meeting was addressed by their lamented friend Jacob Bell, and to the very simple and lucid manner in which he then laid before the assembly the importance of self-elevation may be traced the origin of that Association. Nor had they been permitted alone to depend on that meeting for the aid of his powerful voice; for frequently, and, indeed, on the very last occasion of their holding a similar meeting in that place, he was amongst them encouraging and leading them on to increased exertion.

But in the prime of his strength and energy he had been removed from them; in him they had lost a valiant leader. It would be vain for him to recount his many services to their cause; suffice it to say, his genius, ever in advance of the time, foresaw the necessity for combined efforts for the elevation of their profession to its proper social position. His genius had elevated them, and, he trusted, so stimulated them, that his premature removal from their midst would not retard their onward progress to the attainment of that position it was his desire to see his brethren occupy. The intelligence of his demise must have affected one and all with a deep sense of personal loss, as of the loss of a faithful tried friend, whose memory was dear to their hearts. Nowhere could they find a champion more devoted and self-denying than he had been.

But, while deeply lamenting his loss, might they not improve the occasion? Had they not relied too much upon Mr. Bell's known ability and readiness to anticipate their every want, and with energy to undertake whatever duty the interests of Pharmacy dictated? Had they not allowed him to overtax his mental and physical powers, and so accelerated his untimely death, instead of bending themselves to united action? Let them, then, for the future endeavour, by cordial and united efforts, to supply the blank his removal had caused.

Mr. Evans said it was with deep regret he had alluded to so painful a subject on such an occasion, but he felt he should not be doing justice to his own feelings or to the society at large, or to the memory of Mr. Bell, had he not afforded the Society this opportunity of endorsing the resolution of their Council.

The thanks of the meeting were voted to the President, and the proceedings terminated.

ORIGINAL AND EXTRACTED ARTICLES.

ON NAMES IN GENERAL, PHARMACOPŒIAL AND PHARMACEUTICAL IN PARTICULAR.

BY MR. A. F. HASELDEN.

"O, be some other name!
What's in a name? that, which we call a rose,
By any other name would smell as sweet."

Thus spoke, through one of his loveliest and sweetest heroines about three hundred years ago, one of the brightest ornaments of English literature; and often since that day have those words been quoted to suit an occasion, but, had the author of them lived and flourished in these days of advertising vans and illuminated pillars, he would probably have thought and written differently. A rose by any other name might smell as sweet, but by no other word could it now be so well expressed, and having so long enjoyed that name, by no other could it be so fully appreciated or understood, no other word or appellation could convey the same meaning or conjure up so many pleasant thoughts and reminiscencies—there is a charm in the very name of rose.

The rose of England never could flourish under any other designation, it would no more be received by any other name than would the thistle of Scotland, the shamrock of Ireland, or the lily of France. One might as soon think of re-christening Punch, the genuine wonder and delight of our boyhood, or the so-called weekly periodical, which does for our manhood what the original did for our youth, effacing for a time our cares, and bringing smiles and sunshine in spite of ourselves.

One might as well attempt to call roast beef, bœuf à la mode; giblet pie, pâté de foie gras; or the all-powerful, prevailing, fashionable colour mauve, plain mallow. Any one seriously so inclined, if not looked upon as an enemy to his country or a person entirely void of taste, would, without the least hesitation, be viewed in the light of a harmless lunatic.

If, then, there would be so much obvious opposition to, and so much seeming disadvantage attending any change in the designation of things so simple in themselves, and purely and simply because time and custom had rendered them so familiar to us that we could never recognize, value, or comprehend them so efficiently under any other name; if in such every-day simple matters we should be found so obdurate to alteration, and so perfectly satisfied with them as they stand at present, how much more cautious should we be, how much more should we weigh, consider, reconsider, and demur ere we change the already established and well received names of any of those preparations of Chemistry, Pharmacy, and our own especial Pharmacopœia, which, in the hands of the skilful and well-informed, are means and ways of health and enjoyment of future days to thousands of thousands, but which might become, in the hands of the careless, or from an alteration imperfectly understood or faintly remembered, instruments of error, accident, or even death itself. However desirable it may be in a scientific point of view that a substance or preparation should be known and called by that name which is generally supposed to be correct or to convey the most perfect representation of its component parts or of its true structure, yet, when we see, as we have often, even among the most learned and scientific, such a diversity of opinion respecting them; when we find men of recognized qualifications speaking of the same substance with a different prefix to its real name, it would seem better even here to leave matters in the condition they so long and so securely enjoyed, rather than risk anything by a change, but when we turn to medicine and pharmacy, and contemplate the amount of danger arising or likely to arise from the misconception of a name, a very slight deviation in the writing of a word, the annoyance to practitioners to have to re-study the vocabulary of Pharmacopœia names, or the difficulty young dispensers have to contend with (but which is of much less importance, youth being the proper

season for study) in becoming acquainted with the nomenclature retained by old practitioners, to say nothing of the fact that the very framers of the names or instigators of a change become ever and anon disappointed with the result, and when an opportunity occurs, return once more to the discarded of other days, we are still more impressed with the necessity of caution. Again, the simple and undeniable fact that many prescribers rather than run the gauntlet between hydrargyri chloridum and hydrargyri bichloridum, prefer writing calomel in plain English, and allowing the patient to see what is to be taken, in face of any chance of disapproval (this being but one amongst many instances that might be quoted, but that it would only be enlarging upon a point which has already been much commented upon), should induce every thinking person who has any influence in the matter to pause and consider before the well-understood and established name of any preparation is changed, even though it should seemingly be for the better; but if certain names must for the satisfaction or gratification of some who think a change absolutely necessary be altered or remodelled, if possible, let some real, substantial, and visible advantage be evident, and the probability of error diminished.

With preparations containing opium it might be wiser and safer to let the opiate nature of the compound be apparent—thus, tinctura opii camphorata seems to me a more suitable name than tinctura camphoræ composita. The comp. may mean any of the many things which enter into compound preparations, it may signify ammonia, or a hundred simple substances, or as in many would-be large mercantile firms, it may stand for next to nothing and nobody. By its present title the camphor is made to appear as the chief feature or ingredient, whereas the opium is the important agent, and should be plainly visible as such. In the pilula saponis composita the same oversight is very marked, the opium is the all-important substance, and should (at least it has always so suggested itself to my mind) be ever before the eyes of the prescriber and dispenser, the more so that a pill has been introduced into the Pharmacopœia bearing an excellent name, and under such, well known and established—viz. pilula aloës diluta, but which it was deemed expedient to metamorphose into pilula aloës c. sapone. It has been advanced as a reason for the alteration in these compounds containing opium that the prescriber might find it expedient that a patient should remain unconscious of taking opium; but in such a dilemma there was already the pilula styracis composita, which might be resorted to, or the numberless liquid preparations, such as tinctura thebaica, liquor sedativus, nepenthe, &c. The same might be said, with equal justice and as little real reason, of a hundred other similar cases and remedies. Every physic taker arrived at years of discretion knows perfectly well the nature of morphia, chloroform, henbane, foxglove, and even strychnine, but they are daily prescribed and swallowed without the slightest hesitation.

A patient who has not sufficient faith in the skill of his M.D. to take a dose of opium, unless it is given secretly, and does not appear upon the surface of the prescription, would be equally anxious to dispute about a dose of aloes, rhubarb, or calomel, and such a case should not be allowed to stand in the way of general utility and security. Such a disputant had better discard his regular attendant, and take his case into his own hands; a proceeding which, if it did not restore his health, would be the quickest and surest way of bringing him to his senses.

Tinctura guaiaci composita and tinctura valerianæ composita, were indifferent substitutes for tinctura guaiaci ammoniata and tinctura valerianæ ammoniata, the comp., as before observed, may signify a variety of things. Ammoniata defines at once the nature of the preparation. Spiritus camphoræ was not well changed to tinctura camphoræ; the same alteration might with as much reason have been made in favour of spiritus rosmarini, myristicæ, juniperi co., &c. The impropriety became obvious to the framers of the Pharmacopœia names in 1851, and consequently they returned to the old name of spiritus camphoræ.

Extractum aloes purificatum, a good sound name, indicating so plainly what

was intended, that no mistake or misconception could unknowingly be made, was converted into extractum aloës, thus giving to the waverer, or the man of easy conscience, an excuse for using the ordinary resinous inspissated juice; for the commercial article is decidedly an extract of aloes, whilst the preparation of the Pharmacopœia was, and is, virtually a purified extract of aloës, and it is now a common practice with many prescribers to write extractum aloës *aquosum*, to ensure the article they desire, leaving it pretty clear that in their opinion extractum aloes does not convey the same meaning. Similar remarks appear in a great measure equally applicable to extractum opii purificatum, which is now styled extractum opii.

The resin of guaiacum is now called guaiacum; one would naturally have supposed that the wood from which the resin is obtained would have been designated as guaiacum, and the product according to its nature or properties, or by the same rule resin of jalap might have been called jalap; it would be somewhat analogous to bestowing the real title upon the son of an earl, whilst the good-natured old gentleman remained content with the second, or title of courtesy.

Many more instances might be cited, but enough has been written, "would it were worthier," to show that a good and sufficient reason for the change of certain names has not always hitherto been sufficiently perceptible. In reference to those changes which have already taken place, it would, I feel, be unwise to return now to any former name, even should it have been proved to be the better; use has made the alteration familiar, although the experience of the last eight years may not have shown the advantage or usefulness thereof, but for the future, in framing our names, let there be no change without a corresponding advantage, or where the gain in a scientific point of view is incompatible with the inconvenience and danger incurred. But to return to our starting point, what's in a name? we have only to turn our eyes in any direction, east, west, north, or south, and from that which we hear and see, it becomes clear to the most obtuse intellect, that to create a name, a good name, is everything to everybody. The height of one man's ambition is to make a charitable name, and consequently every institution finds him a subscriber; another to be a politician, and so every debating society upon legislative measures finds him a member; another as a great pleader, and he makes his way to the bar; another as a great general, and so he is to be found, regardless of the horrors and miseries of war, calculating the destruction of his fellow-creatures, and passing with the greatest sang froid to and fro the battle-field, heedless alike of the dying and the dead. As with the professions so it is with trade and commerce, if we wish to create a sale for a particular article, or to attract general attention, having prepared or devised the commodity, the next thing to be done is to hit upon a good name, something trite, easily remembered, neatly turned and taking, whether it be an article of personal adornment, household furniture, culinary convenience, dietetic or medicinal, the name is the thing upon which its future rise or fall mainly depends.

With medicinal compounds or preparations it is by no means uncommon to find them offered for sale under a name which does not convey a just description, but where the name is made quite subservient for the purposes of profit. Although a long, if not a goodly list might be put together, I shall only mention two more especially touching the Pharmaceutical Chemist, because he is sometimes called upon to speak as to the validity of the articles in question; one of these is the castor oil capsule, supposed to contain an average dose of that medicine in a condensed or compressed state, whilst in fact it is a mixture of castor and croton oil. Another preparation is the effervescing *citrate* of magnesia; of the many productions sailing under this pleasant name, there are some that contain little more than a trace of, if any, citric acid, and a very homœopathic quantity of magnesia; sugar, bicarbonate of soda, tartaric acid, and essence of lemon, with a small amount of magnesia, being in truth the real composition. This is a pleasant preparation, may be equally useful, but certainly

is not that which its name represents it to be. There are others evidently composed of carbonate of magnesia, bicarbonate of soda and citric acid, the acid being slightly in excess, and all carefully and well dried. The effervescing citrates in general are very unstable compounds, and as such cannot be kept any length of time in a state of themselves to produce much effervescence. The true citrate of magnesia is not a readily soluble salt. A form was mentioned some time ago in the *Pharmaceutical Journal* for preparing a soluble citrate of magnesia, but I have not yet been able either by that or any other form to produce a *dry* citrate of magnesia soluble to any great extent, or possessing any very distinct effervescing property.

Now one of the consequent and natural results of offering any preparation to the notice of the profession which is not virtually what it is represented to be, is, that a trial of the preparation is not satisfactory, a more particular inquiry is made respecting it, the practitioner discovers to his evident annoyance and disappointment that his patient has not been taking what he believed, he is disgusted at the discovery, turns a deaf ear to the next introduction of probably a genuine preparation, looks upon it with distrust, and discards all novelties for a considerable period of time.

There is but one more class of names which I shall at present venture to touch upon, that is, where several names are seemingly used towards the same preparation, and this is particularly to be observed in the syrup of phosphate of iron, sometimes called syrup of superphosphate of iron, and sometimes syrup of pyrophosphate of iron. I have no doubt that generally the same preparation is looked for, but in the first, if prepared as the name would imply, an opaque syrup of an insoluble compound is the result; in the last two, an excess of acid to the phosphate enables the operator to produce a clear preparation, but this is uncertain in its strength and unstable in its nature. In order to meet this difficulty, the General Apothecaries' Company have introduced a preparation by the assistance or addition of citrate of ammonia, to the phosphate of iron, and thus a preparation in scales is obtained, analogous to the ammonio-citrate of iron, which still sails under the name of pyrophosphate of iron, and with which a light brown or dark straw coloured syrup is prepared, bearing the title of syrup of pyrophosphate of iron. Thus the name, well sounding in itself, is given to an article of which it does not truly represent its real character. With this confusion of names and preparations the Pharmaceutical Chemists and dispensers, whether in a large or small way, are sometimes overwhelmed, and the accumulation of specimens of many of these productions fills up a large space, without any one of them being brought to light above once or twice in a lifetime, and then, alas! how changed!

In parting with my subject, which has already been too much lengthened, I cannot resist repeating how much appears to depend upon a name; in giving new names or altering old ones, let that which shall convey the best accounts of the preparation, combining as far as possible simplicity and utility, be the chosen one.

18, *Conduit Street*, *July* 13, 1859.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Composition of Vegetable Cells.—M. Fremy has been engaged in some researches on this subject, the results of which he has presented to the French Academy. The nature of the liquids which are found in the vegetable cell have been several times accurately determined, but our knowledge of the insoluble portion, or cell walls, is very imperfect. We know that solid matter is deposited on the interior of the cellular membrane, and increases its thickness; several reagents show that the chemical composition of these layers is often ternary and often nitrogenous, but the insolubility of these bodies in neutral liquids renders their separation at the present time impossible, and prevents their composition being properly established.

The examination of the vegetable cellular membranes possesses, however, very great interest both to the Chemist and the vegetable physiologist. We see, in fact, these membranes undergo during vegetation some remarkable modifications; in certain cases their thickness increases rapidly, while in other cases it diminishes in as notable a manner. The latter phenomenon is presented during the ripening of almost all fruits. The cell walls of green fruit are at first very thick, and formed of several concentric membranes; at the period of maturation, however, these walls become rapidly thin, as indicated by the changes which take place in the hardness and transparency of the fruit. It can also be rigorously determined by analysis. The following are the results of the examination of the solid pericarp of two species of pears taken at different periods of their development and maturation:—

		Per-centage of membranous tissue. Winter pear.	Summer pear.
June	16	17.7	13.4
"	24	17.4	13.4
July	1	14.8	11.0
"	9	14.0	11.0
"	17	12.5	11.0
"	26	9.2	6.7
August	4	5.8	6.0
"	12	4.8	5.1
"	20	3.8	4.4
"	28	3.4	3.5

Similar analyses to the preceding were made upon fruits, such as apples, which ripen after they are detached from the tree, and which do not alter in size during maturation. From these experiments it results that the cell walls in these fruits undergo a notable diminution of weight during the period of maturation; it therefore became interesting to know what were the membranes in the cell walls which were thus absorbed at a certain period of the growth. M. Fremy, several years back, showed that vegetable tissue contains an insoluble substance, which he named *pectose*, constantly accompanying the cellulose, and that under very slight influences this body becomes soluble, and is converted into *pectine.* This modification explained the origin of a gummy substance which appears in the juice of fruit which has ripened or has been decocted; and it appeared probable that the interior membranes of the cell, which become altered, are composed of pectose, whilst the exterior membrane is formed of cellulose, which is a very stable body. The solvent for cellulose, cuprate of ammonia, discovered by M. Schweitzer, and successfully employed by M. Peligot in determining the composition of the skin of silkworms, afforded the means for ascertaining the chemical nature of the walls of vegetable cells. The ammoniacal solution of copper may be prepared by the direct action of solution of ammonia and atmospheric air on metallic copper, or by dissolving hydrated oxide of copper in caustic ammonia. The solution prepared in either of the above ways is a perfect and immediate solvent for cellulose. To determine with this reagent the composition of the vegetable cells, thin slices of fruits or roots are cut up and left to digest for some hours in the solution. The cells assume a green colour, swell out, and appear to disaggregate. After the action of the reagent, the tissue, examined under the microscope, had preserved its original form, but the outline of the cells was less distinct. In these experiments care was taken to employ tissues which contained no trace of starch, in order to avoid any secondary reaction. On examining the ammoniaco cupric solution which had reacted on the cells, it was found to contain the traces of nitrogenous bodies, and all the cellulose which formed the primary membrane of the cells and fibrous tissue. The proportion of cellulose which has been dissolved may be readily determined by saturating the liquor with a weak acid, and washing the precipitate with a dilute solution of potash. The green insoluble matter, which has preserved exactly the form of the original cells, consists of the pectic substance modified by the action of the reagent. Analysis proves that it is formed of pectate of copper ; it is decolorized by the action of acids, and leaves a residue of pectic acid which may be entirely dissolved in the alkalies, only imponderable traces of mineral matter remaining in the liquid. Thus then, the new reagent dissolves the cellulose and the nitrogenous bodies, and it transforms the pectose into pectate of copper without, however, at all affecting the shape or form which it had in the cell; the acids decompose the pectate of copper, leaving the

pectic acid insoluble. Potash dissolves the pectic acid, precipitating the traces of lime salts. These facts leave no doubt of the important part which the pectic compounds play in vegetable organization. In certain cells these bodies are more abundant than the cellulose itself, they incrust the cells and augment the thickness of their walls.

This new reagent does not attack all cellular membranes. Thus, the pith of certain trees and the spongy tissue of champignons resist its action. It may therefore be inferred, seeing that this body instantly dissolves the cellulose of roots and fruits, but exerts no action upon the cells which form the pith of trees, that several species of cellulose may exist, differing in their chemical properties.

In the course of his experiments, M. Fremy obtained from the cells of fruits a new and interesting body, which he terms *cellulic acid.* It is readily obtained by submitting the pulp of fruits or roots, from which all soluble matter has been removed by washing, to the action of lime. Cellulate of lime is produced, which remains dissolved in the water, and is precipitated by alcohol. This salt, decomposed by oxalic acid, gives the pure cellulic acid. This body is soluble in water. Its acidity is comparable to that of malic acid. It forms soluble compounds with all the bases, and reduces with great facility the salts of gold and silver. This acid is not derived from cellulose or from pectine, because these bodies properly purified do not yield it. M. Fremy is still engaged in the investigation of this body. It appears, however, to be of some importance, in a practical point of view. In one process for preparing sugar from beetroot, the pulp is submitted to the action of lime before being pressed. The vegetable membrane is thus modified, it loses its elasticity, and is more easily expressed, the pectic compound being changed into pectate of lime. A juice is then obtained, which is very easily worked, but it retains an alkaline reaction, which carbonic acid does not remove, and retains in solution a notable proportion of lime salt, which prevents the crystallizing of the sugar, and gives it a disagreeable odour. This body proves to be cellulate of lime. From the foregoing experiments M. Fremy concludes that the cell walls of fruits or roots are formed of different membranes, which microscopic observation cannot distinguish, the external membranes being formed essentially of cellulose, and the internal of pectic substances. This latter substance is associated in the cell to a new principle, which under several influences produces an energetic acid, which he terms cellulic acid.

On the Preparation of Propionic Acid.—M. Wurtz has shown that when dry lactate of lime is heated in a retort with pentachloride of phosphorus, a colourless fuming liquid is obtained, consisting of a body, which he has termed chloride of lactyle, and to which he assigns the formula $C_6\ H_4\ O_2\ Cl_2$, mixed with some of the pentachloride. Dr. Ulrich, in the course of some experiments upon the constitution of this body, considered by Wurtz as a chloride of lactyle, found that when decomposed with water it furnished, not lactic acid, as it should do according to Wurtz's views, but chloropropionic acid, together with hydrochloric acid. Dr. Ulrich therefore regards the body, according to the views of Professor Kolbe, as a chloride of chloropropioxyl:—

$$\left(C_4 \left\{ \begin{matrix} H_4 \\ Cl \end{matrix} \right.\right) C_2\ O_2\ Cl.$$

To prepare the propionic acid, dry lactate of lime is first distilled with pentachloride or phosphorus, and the distilled liquid allowed to drop gradually into a vessel of water, kept perfectly cool, and containing some finely granulated zinc. An abundant evolution of gas immediately takes place, and when at length the drops of oil have entirely disappeared, and the odour of the distilled product no longer perceptible, the acid liquid is decanted, diluted with water, and distilled. The watery distillate contains a considerable quantity of pure propionic acid, with traces of hydrochloric acid. This liquid may be neutralized with carbonate of soda, the solution evaporated to dryness, and again distilled with sulphuric acid.

This process is said to be so productive, and to yield so pure a product, as to be preferable to all other methods.

On the Preparation of the Red Sulphide, or Vermilion of Antimony.—M. Kopp has recently published a process for the preparation of sulphide of antimony, which consists in reacting on chloride of antimony with hyposulphite of lime. He does not prepare the chloride of antimony in the usual manner, by dissolving the

native sulphide in hydrochloric acid, but the sulphide is previously roasted, by which it is converted into oxide or glass of antimony, which is then dissolved in the acid. The hyposulphite of lime is prepared by acting on sulphide or oxysulphide of calcium with the sulphurous acid which is formed during the roasting of the native sulphide of antimony. The oxysulphide, together with water, is put into a wooden box or cask, which is fitted with an apparatus by which the contents can be kept constantly agitated. The sulphurous acid gas is then passed through the vessel until the liquid becomes slightly acid. The dilute solution of hyposulphite of lime so obtained, after allowing the impurities to settle down, is decanted off into a tub, fitted with a coil of pipe, through which steam can be passed so as to heat the liquid. Some of the chloride of antimony is then poured into the solution of hyposulphite, while still cold, as long as the white precipitate of oxychloride which is first formed, continues to dissolve. A clear colourless liquid is thus obtained, which should always contain an excess of the hyposulphite. This solution is then gradually heated and kept constantly agitated; in a short time it becomes yellow, then orange-yellow, orange, orange-red, and lastly, almost pure red. The heat must be arrested before the orange tint has entirely disappeared, because if it be too much prolonged, or becomes too high, the colour will pass to a brown or blackish shade. The vessel is covered over and the vermilion of antimony allowed to deposit, the clear supernatant liquid is then decanted off into another tub, and sulphide or oxysulphide of calcium added until a permanent black precipitate of sulphide of iron begins to form, carefully avoiding the addition of an excess of sulphide. Hyposulphite of lime is thus again obtained, and may be used for a fresh operation. The mother-liquors may thus be used a number of times for the reproduction of the hyposulphite, until they become saturated with chloride of calcium.

The iron which is present in the mother-liquor is due to the iron which always accompanies the crude antimony, and its presence is an advantage, as the hyposulphite of iron acts in the same way as the hyposulphite of lime, while it also indicates when the liquid is saturated with the sulphide of calcium.

The sulphide of antimony deposited at the bottom of the tub is collected, repeatedly washed and dried at a gentle heat. It constitutes a pigment which is unaffected by air, light, sulphuretted hydrogen, or the weak acids.

On the Manufacture of Sulphate of Baryta.—Some manufacturers are in the habit of preparing sulphate of baryta, or "baryta white," for use as a pigment, by dissolving the native carbonate in hydrochloric acid and precipitating with sulphuric acid; the hydrochloric acid is thus again set free, and may be used for a fresh operation. M. Pelouze has shown that this process may be much simplified by treating the native carbonate, in small lumps, with diluted sulphuric acid, to which a very small quantity of hydrochloric acid has been added, and keeping the mixture heated to near its boiling point. Under these circumstances, the lumps of carbonate are speedily attacked and resolved into a fine white powder, consisting entirely of the sulphate of baryta. If the same experiment be performed, omitting the minute quantity of hydrochloric acid, scarcely any action whatever takes place. The hydrochloric acid acts as a carrier of the baryta to the sulphuric acid. M. Pelouze found, upon treating pieces of marble in a similar manner, that the reaction took place with much less readiness, and was very imperfect. This process is not, therefore, available for the decomposition of marble.

Anhydrous Sulphate of Alumina.—M. Persoz has pointed out a means by which this body may be readily prepared. We know that when bichromate of potash is heated with a considerable excess of concentrated sulphuric acid, a portion of oxygen of the chromic acid is expelled, and anhydrous sulphate of chromium, together with bisulphate of potash, results. If this residue be washed with water, the bisulphate of potash is dissolved out, and the pure anhydrous sulphate of chromium remains insoluble. So, if ferrocyanide of potassium is heated with a very large excess of oil of vitriol, carbonic oxide gas is liberated, and anhydrous persulphate of iron formed, which, in consequence of its insolubility, may be readily purified from the soluble sulphates which accompany it. This salt, submitted to the prolonged action of water, gradually becomes hydrated, and assumes all the characters which we recognize as belonging to persulphate of iron. It appears, therefore, to be an error, in many cases where peroxide of iron and strong sulphuric acid react together, to suppose that an insoluble *sub*-sulphate is formed, the result being due to the *anhydrous neutral* sulphate.

From the great analogy which exists between the oxygen compounds of aluminium, chromium, and iron, it may be presumed that anhydrous sulphate of alumina may be formed under analogous, if not identical, conditions to those by which the corresponding salts of iron and chromium are obtained. When alum or the sulphate, the chloride, or the nitrate of alumina—in fact, any salt of alumina immediately attackable by sulphuric acid—is treated with a great excess of concentrated and boiling sulphuric acid, an abundance of anhydrous sulphate of alumina is produced in the form of a white farinaceous powder, rather heavier than the oil of vitriol.

If some pure alum, with about ten times its weight of strong sulphuric acid, be heated in a platinum vessel until three-quarters of the acid employed is driven away, a residue is obtained, which may be washed three or four times with water,* to remove the bisulphate of potash and excess of acid, and the insoluble portion collected on a filter and pressed. A soft white powder is thus obtained, without taste or odour, without any action on test papers, and which, when submitted to analysis, furnishes sulphuric acid and alumina in the proportions to form a neutral but anhydrous salt, thus:—

	Experiment.		
	I.	II.	Calculated.
SO_3	70.113	70.043	70.07
Al_2O_3	29.943	29.893	29.93

This composition can be confirmed by a simple experiment, which consists in boiling a portion of the substance in water for some time; the salt slowly dissolves, furnishing a perfectly transparent solution, which strongly reddens litmus paper, and which, evaporated to a syrupy consistence, and mixed with a little alcohol deposits definite crystals of hydrated sulphate of alumina. M. Persoz also suggests that this process might constitute a means of manufacturing alum from kryolite, a double fluoride of sodium and aluminium, in case that mineral should ultimately become more abundant. By distilling this substance with oil of vitriol, hydrofluoric acid mixed with sulphuric acid would pass over, and anhydrous sulphate of alumina be obtained, which might be washed, then boiled in water, and the salt of potash added.

On Acetate of Alumina.—M. Tissier has indicated that if gelatinous alumina be dissolved in acetic acid, so as to obtain a liquid having a density of 8° or 9° Baumé, and the solution be preserved in well-stoppered bottles for any length of time, a more or less crystalline white precipitate is deposited, containing the whole of the alumina; and the liquid becomes strongly acid, but retains only a trace of the base. This precipitate is insoluble in water, dissolves with difficulty in the weak acids, and very readily in caustic alkalies. Several analyses of this body established for it the following formula:—

$$Al_2O_3\ 2\ (C_4H_3O_3) + 6\ HO.$$

It does not contain any trace of potash or soda.

ON THE SYNTHESIS OF THE HYDROCARBONS.

BY M. MARCELLIN BERTHELOT.

(*Continued from page* 480.)

5. *Action of a Mixture of Sulphide of Carbon, Sulphuretted Hydrogen, and Oxide of Carbon upon Metallic Iron.*—The preceding experiments establish the formation of marsh gas in the simultaneous action of sulphide of carbon and a hydrogenated gas upon the metal. The formation of olefiant gas, however, although demonstrated by its regeneration from the bromide, is not very considerable, and it became desirable to devise some means of augmenting its proportion. It was thought that this object might be attained by using, instead of a single carbon compound which would tend to produce a carbide but little condensed, such as marsh gas, a mixture of two compounds, as being more likely to form olefiant gas, which contains twice the amount of carbon in an equal volume. In fact, the process which has furnished the best results consists in adding to a mixture of sulphide of carbon and sulphuretted hydrogen

* Dilute alcohol may be used to remove the last traces of acid without risk of hydrating the salt.

another gas, oxide of carbon, and making the whole to react on metallic iron. Under these circumstances the affinities of the iron and the hydrogen are concurrent, and nascent carbon results from two different sources, namely, the sulphide of carbon and the oxide of carbon. It therefore tends to enter into a higher order of combination. The following are the details of the experiment:—

Currents of sulphuretted hydrogen and oxide of carbon are passed into a tritubulated bottle where they are mixed, they are then dried by chloride of calcium, and passed through a flask containing sulphide of carbon; the mixture of the three bodies is then directed over metallic iron heated to dull redness, from thence the gases pass through the condensing vessels to the pneumatic trough.

The sulphuretted hydrogen is produced by the action of diluted sulphuric acid upon sulphide of iron prepared by the wet method. It is purified in a washing bottle. The oxide of carbon, prepared by the mineral process, is previously dissolved in an acid solution of chloride of copper; 4 to 5 litres of this solution are then placed in a flask and gently heated, when the gas is disengaged with perfect regularity. It is washed, first with water, then by passing through a layer of bromine under water, and lastly with a strong solution of caustic soda. The metallic iron intended to decompose the gas is contained in a copper cylinder, having each end shaped in the form of a hemisphere, into which a copper tube is soldered. This apparatus, which has a capacity of above a litre, is the only one which answers the purpose well. It has a considerable internal capacity, thus enabling a large quantity of material to be operated upon at once, and being of an elongated form, it gives time for the reaction to be completed. Copper also is the only material which can be conveniently used, as the vessel has to sustain considerable and sudden variations of temperature, which excludes the use of glass or earthenware. It is necessary to close the apparatus with very fine corks without the use of any kind of luting. In the copper cylinder is introduced as large a quantity of iron turnings as possible, which have been previously well washed, sorted, and then calcined, to destroy all organic matter. The cylinder, arranged horizontally, is then heated to redness, and a current of pure hydrogen passed through, in order to reduce all the iron to the metallic state. To attain this result requires nearly three days. During this reduction the tubes passing from each end of the cylinder are kept cold by means of water, in order to protect the corks. When the reduction of the iron is complete, the mixture of gases is passed through while the apparatus is at a dull red heat, and a regular current is continued until the heated copper, contained in a green glass tube following the metallic cylinder, is attacked by the sulphur compounds. The experiment is then stopped. The gases, after being desulphurized in the cylinder, and having traversed the glass tube which follows it, pass through a cooled flask and then into a washing bottle containing acetate of lead, intended as a test. From these they bubble through an eprouvette containing bromine, are washed by a solution of soda, and then collected over water. The bromides formed during the experiments are isolated by treating the bromine from the eprouvette with solution of soda, and separating the heavy neutral liquid, which is insoluble in the aqueous liquor. The larger part of the bromide thus obtained distilled between 125° and 130° C. a very small quantity of a compound remaining in the retort which appeared to contain a derivative of naphthaline.

The gas regenerated from the bromide by means of water, copper, and iodide of potassium, heated together in a sealed tube to 275° C., was found by analysis to have the following composition:—

Olefiant gas	90
Hydride of ethyle.....	5
Carbonic acid	2
Nitrogen	3
	100

These results establish the formation of olefiant gas by means of sulphide of carbon. A notable proportion of the sulphide contributes to this formation. The proportion of carbon contained in the olefiant gas rising to a sixteenth of the carbon contained in the sulphide : that is to say, 32 litres of the vapour of sulphide of carbon may furnish 1 litre of olefiant gas. The proportion of carbon which contributes to the

formation of marsh gas is much more considerable, for 8 litres of vapour of sulphide furnish upwards of 1 of marsh gas.

The marsh gas obtained by these processes may be separated from the hydrogen with which it is mixed, and obtained in a state of purity. The gas, having been washed with bromine, is agitated with absolute alcohol, previously boiled, and, after a sufficiently prolonged agitation to saturate the alcohol, under a pressure slightly superior to the atmosphere, a small flask is exactly filled with the solution, and then boiled. Ordinary means are adopted to isolate the gas which is disengaged.

To demonstrate the complete identity of the olefiant gas prepared by means of sulphide of carbon with the ordinary olefiant gas, it was considered necessary to convert it into the characteristic alcoholic compounds. The gas obtained in the experiment last described was agitated with concentrated sulphuric acid. The absorption took place in the characteristic gradual manner, requiring very prolonged agitation. When terminated, the acid was diluted, avoiding any notable rise of temperature, saturated with carbonate of baryta, and the sulphovinate of baryta crystallized out. This salt was then heated in an oil bath to between 200° C., and 220° C., with benzoate of potash and benzoic ether obtained.

These experiments, therefore, furnish another method by which the synthesis of marsh gas, of olefiant gas, and of alcohol may be realized by means of the simple bodies of which they are constituted.

Action of several Hydrogenated Bodies on Sulphide of Carbon.—The experiments which have been described are the most decisive as to the transformation of sulphide of carbon into carbides of hydrogen ; several others, however, were made, which are interesting as showing in all lights the affinities which concur to the union of carbon with hydrogen.

1st. Direct action of the hydrogenated gases upon sulphide of carbon. The action of hydrogen upon sulphide of carbon at a dull red heat gives rise at first to a deposition of sulphur arising from the oxidation of the sulphide by the air in the apparatus, but after that no further change appears to take place.

Arseniuretted hydrogen, saturated with the vapour of sulphide of carbon and then heated, is decomposed with the formation of a little sulphide of arsenic and sulphuretted hydrogen, but without any sensible deposit of carbon. A little marsh gas appears to be formed.

The action of hydrochloric acid gas at a dull red heat upon sulphide of carbon is practically nothing. Ammonia gas, even in the presence of copper, also furnishes no gaseous carbides.

It is different, however, with hydriodic acid gas ; this reaction is effected by directing the mixture of this gas with sulphide of carbon through a porcelain tube heated a little above a dull red heat. There is formed some carbon having a metallic appearance, iodine, some free sulphur, and probably hydrosulphuric acid. At the same time there passes unaltered some sulphide of carbon, hydriodic acid, and some phosphoretted hydrogen (resulting from the iodide of phosphorus employed). A little oxide of carbon and carbonic acid are produced by the air in the apparatus, and hydrogen, and a certain proportion of gaseous hydrocarbons, are simultaneously formed. The volume of the latter is small, amounting only to 20 cubic centimetres in an experiment in which 50 grammes of iodide of phosphorus were operated upon.

The gaseous mixture obtained in this experiment was analyzed by removing the hydriodic acid with water, and taking out from one portion the sulphuretted hydrogen and carbonic acid together with potash, and then the phosphoretted hydrogen with sulphate of copper, while from the other portion the phosphoretted hydrogen and sulphuretted hydrogen were removed together by sulphate of copper, and then the carbonic acid with potash. The oxygen was afterwards absorbed by pyrogallic acid, the vapour of sulphide of carbon by potash moistened with alcohol, and the gas washed. One portion of this gas was then exploded in the eudiometer, and another portion treated with bromine to remove olefiant gas, then with chloride of copper to absorb the oxide of carbon, the residue exploded in the eudiometer, and the nitrogen determined directly. The last combustion enables the proportion of hydrogen and marsh gas to be determined, and, by comparing it with the first, it should verify the olefiant gas ; some uncertainty exists with the latter gas, however, arising from the difficulty of previously separating the whole of the phosphoretted hydrogen and sulphide of carbon. The following was the result:—

Marsh gas	17.5
Olefiant gas	7
Oxide of carbon	2
Hydrogen	33.5
Nitrogen	40
	100.0

The reciprocal action of hydriodic acid and sulphide of carbon, therefore, at a red heat, gives birth to marsh gas, and probably to olefiant gas, supposing the phosphoretted hydrogen takes no part in the phenomena. The reaction can be conceived in consequence of the facility with which hydriodic acid is decomposed, furnishing nascent hydrogen ; but it is not easy to state precisely the true play of affinities which contribute to the formation of carbides of hydrogen. The proportion of these carbides obtained is very small in relation to the weight of the hydriodic acid gas; for, to obtain 1 litre of hydrocarbons, it is necessary to employ 3 kilogrammes of iodine.

2nd. Action of nascent hydrogen upon sulphoxybromide of carbon. If we leave for several months a mixture of bromine and sulphide of carbon in presence of water, a particular liquid compound is formed, which contains bromine, sulphur, oxygen, and carbon. It suffices to mix the two bodies for the formation of this compound to commence. To isolate this body the mixture is agitated with potash until decolorized, and a heavy liquid, colourless or slightly orange, and having a peculiar and extremely tenacious odour, is separated, and submitted to distillation, the more volatile portions being rejected, as consisting principally of sulphide of carbon. The portions passing over between 150° and 200° Cent. contains carbon, bromine, sulphur, and oxygen, but no hydrogen. Treated with a strong solution of soda, it slowly dissolves, forming sulphate of soda, bromide of sodium, &c., and a particular salt, crystallizing in rhomboidal tables, containing the above elements with sodium. The sulphoxybromide of carbon heated to 250° with water and zinc, yielded hydrogen, carbonic acid, and a small proportion of a combustible carbonized gas. Heated to 275° C. with copper, water, and iodide of potassium, it yielded carbonic acid, hydrogen, and oxide of carbon. With water and iodide of potassium it produces carbonic acid, sulphide of carbon, oxide of carbon, &c. This compound, in fact, did not give satisfactory results in the production of hydrocarbons.

3rd. Decomposition of sulphide of carbon by nascent hydrogen at 275° C. Sulphide of carbon, zinc, and water, were heated in a sealed tube to 275° for fifteen hours. The tube was then opened under mercury, and the gas disengaged analyzed. It was treated with moist sulphate of copper for several minutes to remove sulphuretted hydrogen (a small quantity of sulphide of carbon is removed at the same time), then with caustic potash to take out the carbonic acid. Pyrogallic acid and potash produced no alteration. The remainder was treated with potash and alcohol, to remove the sulphide of carbon, and then with bromine, which effected no alteration in its volume ; the residue was then exploded in the eudiometer, and gave

Marsh gas	3.7
Hydrogen	76.6
Nitrogen	19.7
	100.0

To the mixture of sulphide of carbon, water, and zinc, was added potash to facilitate the elimination of the sulphur. The mixture heated to 275° furnished pure hydrogen.

Copper and water do not act sensibly on sulphide of carbon at 250°. Copper, water, and iodide of potassium, heated to 275° with sulphide of carbon for five hours completely destroyed it, with formation of carbonic acid and hydrogen, a little sulphuretted hydrogen, and a trace of a combustible gas, which appeared to be marsh gas. Iodide of potassium, water, and sulphide of carbon at 275°, only yielded sulphuretted hydrogen and carbonic acid.

Transformation of Marsh Gas into Propylene.—Marsh gas is the simplest and least condensed of the carbides of hydrogen ; one litre of the gas containing only half a gramme of carbon, while all the other known hydrocarbons contain at the least one gramme of carbon to the litre. The synthesis of marsh gas also is the first

step in the synthesis of hydrocarbons; we can then go further and submit the marsh gas itself to several reactions: one depending on the intermediate formation of new liquid compounds, and especially on the synthesis of wood spirit, as already described, and others resulting from the direct action of several gaseous bodies upon the marsh gas itself. This gas is not only the poorest in carbon of all the gaseous hydrocarbons, but its hydrogen is in a greater proportion to the carbon than occurs in other gas; it is this which indicates its name, protocarbide of hydrogen, and its formula $C_2 H_4$, according to which hydrogen constitutes one-fourth of the weight of the gas. If then we remove from marsh gas a portion of this hydrogen, by means of moderate actions we may hope to obtain one of the other known carbides richer in carbon and more condensed. To effect the removal of this portion of hydrogen, several methods were devised, such as oxygen or chlorine, employed in small quantities with the aid of the electric spark or the sun's light; or again by the action of bromine, iodine, carbonic acid, &c., at a red heat; but the process which was most successful consisted in reacting on the marsh gas with oxide of carbon at a red heat. The two gases were made to pass together through a green glass tube, heated to dull redness, and filled with pieces of pumice-stone. In this way a small quantity of propylene ($C_6 H_6$) was obtained. This formation appears to be due to the reaction of two volumes of marsh gas upon one volume of oxide of carbon.

$$2\ C_2 H_4 + C_2 O_2 = C_6 H_6 + 2\ HO.$$

The oxide of carbon was disengaged from its solution in chloride of copper, washed by passing first through water, then through two eprouvettes, each containing bromine, and then mixed in a tritubulated flask with the marsh gas.

The marsh gas was produced by the distillation of a mixture of fused acetate of soda and soda lime. It was washed, first with water, then in two vessels, each containing bromine under a layer of water, and lastly, mixed with the oxide of carbon. The two gases were then passed together through bromine, a concentrated solution of soda, and then into the green glass tube containing pumice-stone. This tube was heated to dull redness. At the end of the tube was placed a cooled flask, a vessel containing water, an eprouvette with bromine, and lastly a bottle holding solution of soda. The experiment was continued for several hours. At the end, the bromine was dissolved in an alkali, and a small quantity of a heavy neutral bromide separated. This was decomposed, and the gas obtained from it analyzed. It gave—

Propylene	72
Hydride of propyle	16
Carbonic acid	4
Nitrogen	8
	100

The formation of propylene under the preceding conditions is then an experimental fact, but a question may be raised as to the real origin of this gas, which it is important not to overlook. The marsh gas used in its production was not obtained from mineral substances, but by the distillation of acetate of soda in presence of an alkali. It is true the acetic acid may be prepared from mineral elements, for example, from alcohol derived from the olefiant gas, as before described; but marsh gas is not the only body which is formed in the distillation of acetates. There are formed, at the same time, gaseous carbides of hydrogen absorbable by bromine, acetone, and several empyreumatic liquids. Can these several products contribute to the formation of propylene, or may not this gas pre-exist mixed with the marsh gas? Without entirely refuting this objection, it may be said that the experiment was made under conditions best suited to the elimination of all products foreign to the marsh gas, for the gas was washed three successive times in bromine, and the last washings did not contain a trace of liquid bromie insoluble in alkali. The bromine also arrests and destroys, not only the foreign gases, but also the empyreumatic vapour. The experiment, moreover, was repeated with the same apparatus, but without disengaging the oxide of carbon, and no trace of bromide of propylene or analogous bromide was obtained. We may admit, therefore, if not with certainty, at least with great probability, that propylene is formed in the reaction of marsh gas on oxide of carbon.

THIRD PART.—*Transformation of Chlorides of Carbon into Carbides of Hydrogen.*

The compounds which carbon forms with the simple bodies present peculiar characters and properties which distinguish them for the most part from other

compounds. These differences are already perceptible in the oxides of carbon, which may, however, be justly compared with the oxides formed by the other metalloids. They become more obvious in the sulphide of carbon, which, if analogous to the ethereal compounds in its physical properties, can be still assimilated to the other sulph-acids. But these peculiarities are very striking when we study the chlorides of carbon. In fact, the chlorides formed by the other metalloids are almost by nature acid, or capable of giving rise to acids by decomposition in contact with water. The liquids dissolve or destroy with great energy. On the contrary, the chlorides of carbon are bodies insoluble in water, and perfectly neutral to either acids or alkaline reagents. In a word, these chlorides possess in a high degree the properties of ethers, that is to say, of the most characteristic compounds of organic chemistry, and the least analogous to compounds formed by the reciprocal union of simple bodies, with the exception of carbon. These special properties of the chlorides of carbon, which already resemble those of the carbides of hydrogen, coincide therefore with a marked difficulty in the union of chlorine with carbon, with a weak stability, and with great variety in the products of this combination. While carbon unites directly with sulphur and oxygen, and the compounds formed withstand extremely elevated temperatures, carbon and chlorine do not combine directly, and a red heat suffices to destroy all their combinations. The chlorides of carbon, at first formed by means of the carbides of hydrogen, have only within the last few years been produced by mineral processes. M. Kolbe first produced them in this way by making chlorine to act on sulphide of carbon. In this way four distinct chlorides are obtained : the perchloride, $C_2 Cl_4$; the sesquichloride, $C_4 Cl_6$; the protochloride, $C_4 Cl_4$; and the chloride of Julin, generally represented as $C_4 Cl_2$, but to which experiments appear to assign the formula $C_{20} Cl_{10}$.

The powerful affinities of chlorine render the conversion of these chlorides into carbides of hydrogen, thus establishing their synthesis by a third class of reactions, comparatively easy. In fact, it is only necessary to act upon these chlorides of carbon with free hydrogen at a dull red heat, to separate the chlorine as hydrochloric acid, a portion of the carbon being set free, and another portion uniting with the hydrogen to form carbides of hydrogen, corresponding to the chlorides decomposed. The experiment was performed by vaporizing the chloride in a current of hydrogen properly regulated, and passing the mixture through a green glass tube filled with pumice-stone, and heated to a point between dull and bright redness, according to circumstances. After traversing the tube the gas passed through a cold flask, a bottle with water, an eprouvette containing bromine, a washing bottle with solution of soda, and was then collected over water. Under these conditions the perchloride of carbon, $C_2 Cl_4$, and the sesquichloride, $C_4 Cl_6$, furnished a considerable proportion of olefiant gas, $C_4 H_4$, and a certain quantity of marsh gas, $C_2 H_4$.

The gas obtained from the perchloride of carbon gave—

Marsh gas	2
Hydrogen	98
	100

From the sesquichloride—

Marsh gas	5
Hydrogen	95
	100

The gases absorbed by the bromine were regenerated as in the other cases.

The gas, absorbable by bromine, produced from the perchloride of carbon, gave—

Olefiant gas	80
Hydride of ethyle	15
Nitrogen	5

From the sesquichloride—

Olefiant gas	24.0
Hydride of ethyle	2.3
Hydrogen	2.3
Oxide of carbon	1.3
Nitrogen	10.0

From the protochloride—

Olefiant gas	77.0
Hydride of ethyle	3.5
Hydrogen	3.5
Oxide of carbon	14.0
Nitrogen	2.0

The chloride of Julin, heated to bright redness in a current of hydrogen, produced a large quantity of a crystalline body presenting the properties of naphthaline, $C_{20} H_8$.

The chlorides of carbon employed in the experiments were all prepared by means of chlorine and sulphide of carbon. These results furnish then a new means of obtaining olefiant gas, marsh gas, and naphthaline, by means of the simple bodies of which they are constituted.

CASE OF POISONING WITH HACHISCH.

BY PROFESSOR K. D. SCHROFF.

I FEEL for many reasons induced to publish the following case of poisoning with hachisch. Some consider *Cannabis Indica*, and all its preparations, to be but little dangerous; and many are inclined to award them a place rather among luxuries than among poisons. But indeed the idea of what entitles a substance to be referred to either the former or the latter category is so uncommonly elastic, that we do not hesitate to class at will a great number of things at one time among luxuries, at another, among poisons. Thus Von Bibra, in his excellent work on the Narcotic Aliments, has not scrupled to adopt arsenic among the number; and, according to the interesting researches of Falk on Caffeïn, no toxicologist can henceforth be found fault with if he transfers coffee and tea, and in short, all parts of vegetables containing caffein, to toxicology, inasmuch as this alkaloid evidently possesses poisonous properties, for it has long been known that very concentrated infusions of tea and coffee are capable of producing phenomena of poisoning. Numerous as are the communications on record in reference to psychical alienations produced by the preparations of hachisch, accurately described cases of intoxication by this drug, to the degree of endangering life, are still to be supplied. I should wish, by the recital of the following case, to spare any who, in the belief that hachisch is scarcely to be looked on as a dangerous remedy, might thoughtlessly give it in large doses, in whatever form it may be imported from the East, the terror and anxiety its employment caused me.

I had already, many years before, in consequence of several experiments made both with the infusion of the herb *Cannabis Indica*, brought from the East, and with its different preparations, especially with various kinds of hachisch, and with the alcoholic extract of the plant, as also with both the *Cannabis Indica* and *Cannabis sativa* cultivated in this country, been convinced from most of the trials of this remedy that, on the one hand, not only the different preparations and the difference of locality where the plant had been cultivated, but also the mode of preservation, and especially the difference in age of one and the same part of the plant, and the time of preservation of one and the same preparation, essentially influenced its activity; and that, on the other hand, the individuality of the person experimented on played a very important part in determining the effects of the remedy. If the latter proposition be more or less true of all substances acting on the nervous system, but especially on the brain, and is, therefore, particularly to be observed of narcotics; there is among the last-named substances, according to my experiments with them—most of which were tried on the same individuals—no other substance of which it is so true as of *Cannabis Indica*, and all its derivatives; a fact I have already pointed out in my *Lehrbuch der Pharmakologie*, pp. 491—95.

In the autumn of 1856 a consignment of various kinds of hachisch, addressed from Bucharest by the apothecary there, Dr. Steege, to Dr. G. Martius, reached Vienna; and from the latter gentleman I obtained permission to take as much of each variety as I should find necessary for my objects, of which permission I moderately availed myself. I determined to subject the specimens to physiological experiment, inasmuch as they differed in their external appearance from the sorts of hachisch I already possessed, and which I had previously tried. Among them was a preparation bearing the name of "Birmingi," while on the label of the glass containing it was marked "macht Keif (that is, produces laughter), ten gran." From this super-

scription I could infer nothing else than that, in the East, they were accustomed to take the preparation in ten-grain doses, and that this quantity threw those who took it into an agreeable frame of mind, and produced laughter.

The preparation belongs to the solid varieties of hachisch; is in the form of tablets, which are very hard and difficult to break; externally it is coloured almost black, and is smooth; on section, or on the under surface, it presents in the centre a dirty greenish-grey colour; it has an uneven fracture; its smell is very slight, it is only from the fresh surface of fracture that an odour calling to mind that of the herb of the *Cannabis Indica* is obtained; the taste is neither bitter nor aromatic, but rather insipid; on prolonged mastication the very tough mass becomes gradually pappy, and eventually dissolves in the saliva, leaving a crumbling solid substance; irritation of the throat also ensues when the drug is chewed for a long time. This species is, therefore, essentially different from that imported from Egypt, with which I had instituted several experiments, and which I have more accurately described in my *Pharmakognosie*, page 130; but it differs still more from the soft varieties of the drug.

Of this "Birmingi," Dr. Heinrich—who had fully tried most narcotics, and in my former experiments on *Cannabis Indica* had taken several preparations of this drug without manifesting any particular susceptibility of them, but rather always served as a check if more violent effects had occurred from narcotics in other individuals, when a steady excitability constantly manifested itself in him—took ten grains at half-past five in the afternoon of the 6th of May, in the present year. He chewed this quantity for about an hour, during which it gradually dissolved and was swallowed; only the insoluble solid residuum, amounting to about two grains, was spit out. Irritation of the throat, eructation, and slight nausea ensued. The attempt to smoke a cigar in the open air had to be given up, on account of dryness and roughness in the throat. Dr. Heinrich took a walk in the town, and inspected the print-shops and play-bills without perceiving any change in himself. At the end of an hour and a half, that is, about seven o'clock, he met an acquaintance, to whom he talked all kinds of nonsensical trash, and made the most foolish comparisons; from this, everything he looked at seemed to him ridiculous. This condition of excitement—in which his face and eyes got redder and redder, the subjective heat of the body considerably increased, and the feeling of facility of motion became constantly more distinct—lasted about twenty minutes. Suddenly a great degree of sadness came over him; everything was too narrow for him; he acquired a disturbed appearance, became pale; his sadness increased to a feeling of anxiety, accompanied by the sensation as if his blood was flowing in a boiling state to his head; the feeling as if his body was raised aloft, and as if he was about to fly up, was particularly characteristic. With the oppression of the chest was combined a sensation of compression and tightness in the præcordial region. His anxiety and weakness overcame him to such a degree that he was obliged to collect all the power of his will, and his companion had to seize him firmly under the arm, in order to bring him on, which was done in all haste, as he feared a new attack, and wished, if possible, first to reach a place where he could be taken care of; but in the course of three minutes, while he was still walking, the attack set in with increased violence. It was only with great difficulty he reached the Pharmacological Institute; here he immediately drank two pints of cold water, and washed his head, neck, and arms with fresh water, on which he became somewhat better. The improvement, however, lasted only about five minutes. He sat down on a chair, and unfortunately (as he observes in his Report) felt his pulse, which he found to be very small and slow, with very long intervals. He was no longer in a state to take out his watch to ascertain more exactly the frequency of his pulse, for the feeling of anxiety came over him again, and with it he traced the premonitory symptoms of a new and violent attack. He was brought into the adjoining chamber, stripped himself partly of his clothes, and gave over his things, directing what was to be done with them after his death, for he was firmly convinced that his last hour had struck, and continually cried out, "I am dying; I shall soon be undergoing dissection in the dead-room." The new attack was more violent than the former were, so that the patient retained only an imperfect degree of consciousness, and at the height of the paroxysm even this disappeared. After the fit, too, consciousness returned but imperfectly; only so much remained in his recollection that the images which rose within him constantly increased in ghastliness until they gave way to the unconscious state, and

that gradually, with returning consciousness, less formidable figures appeared in their stead. Subsequently he stated that it appeared to him as if he were transported from the level surface to a hill, thence to a steep precipice, thence to a bare rock, and lastly to the ridge of a hill, with an immense abyss before him. From this time he could no longer control the current of ideas following one another with impetuous haste, and he could not avoid speaking uninterruptedly until a fresh attack came on, which quite deprived him of consciousness for some minutes.

At this time (a quarter past eight) I was called to Dr. Heinrich, and did not leave him until all danger was over. Before I report my observations, I shall let him describe his own case:—

"The flow of my ideas had now free course, and notwithstanding my great loquacity, I could utter only a few words of what I imagined. All my thoughts and deeds from my childhood came into my mind. I believed that I had, although imperfectly, spoken out my whole character. The fear of dying no longer indeed laid hold on me to the same degree as before, yet I remember to have said that they should leave me, for what and as I then was, I should be always. The senses of sight and hearing were unimpaired, for when I opened my eyes I knew all those who were standing about me, and equally recognized them by their voices when my eyes were closed; and I answered what they said in some suitable words, without connecting the latter, as my speech was soon subordinated to my fertile imagination. I cannot recollect the moment when Professors Brücke and Schroff came to me, neither did I know that sinapisms were applied to me, and that my feet were rubbed with brushes. It was not until the second day that I perceived this from the sore spots on the back of my left foot: the sensibility of my skin was much blunted. Nor can I recollect when the severe rigour occurred which was observed in me after the last most violent attack. The urine I could not retain; it passed involuntarily from me. Towards ten o'clock—that is four and a half hours after the seizure—the storm was somewhat allayed; I obtained the control over my imagination, ceased to speak incessantly, and traced some pain in the præcordial region, in the place where irritants had been applied. At this time *café noir*, with lemonade, was brought, which I remember, though I cannot state the time when it took place. The flow of my ideas was too rapid, and I therefore thought that it was already very late. The time given above I state only according to what I was afterwards told, for I am not in a position to form an opinion as to the time and duration of the paroxysms. During the night I drank a great deal of lemonade, and another cup of *café noir*, nevertheless, sleep fled from me, for my imagination was constantly at work. I was obliged to pass water several times, which at first took place not without difficulty. Next morning I dressed, and had myself brought home, but could not set to my usual daily work, because, notwithstanding the greatest effort, I could not collect my scattered thoughts, and I also felt corporeally too weak. I was, therefore, obliged to take to bed, where I remained until the morning of the third day. During this time I drank four pints of lemonade, and took soup only twice, as I had no appetite. On the third day I had myself led about, supported by a second person, but was still rather confused and giddy. This day also, for want of appetite, I ate but little, but still drank lemonade. I passed urine without difficulty; perspiration did not take place; the bowels had not acted for three days. During the second and third nights my sleep was tranquil. On the fourth day I felt well again; regained appetite; my strength increased; my appearance became less unsettled. Nevertheless, walking about for half an hour tired me very much. The depression which came on after the excitement gave way only gradually. On account of constipation I had, on the third day, taken a Seidlitz powder, but except the discharge of flatus this produced, it had no effect; it was not until I had, on the fourth day, swallowed two Seidlitz powders, that several motions took place."

As has been stated above, I saw the patient at a quarter-past eight. He recognized me immediately, as well as all those about him whom he saw and heard. I found him lying in bed; his face red, as in health; the cheeks rather hollow; the pupils moderately dilated, but the iris sensitive to the stimulus of light; the eyeball moved freely; the lustre of the eyes was unchanged; the conjunctiva of the globe was somewhat congested; the forehead was cool; even after the removal of the cold applications which had been used, the forehead and head were only moderately warm, never hot. The carotid and temporal arteries pulsated feebly and more slowly than in the normal state; the pulsation of the heart was very weak, and sometimes

scarcely perceptible; the pulse at the wrist often stopped for a minute and more, and when it returned it was uncommonly weak, and only perceptible when carefully sought for; subsequently it became more distinct (at intervals of from ten to fifteen minutes) and more frequent, and rose to seventy-eight, which, for the patient, whose pulse in its normal condition was from fifty-eight to sixty, was tolerably quick. These variations in the pulse, with which the action of the heart and of the carotid and temporal arteries corresponded, were repeated frequently within an hour; the respiration was low; in other respects it was regular. The abdomen was somewhat tympanitic, otherwise it, as well as all other parts of the body, was free from pain; the extremities, both upper and lower, were cold, sometimes tremulous; they were movable in every direction, and were obedient to the influence of the will; the skin was insensible to stimulants, as sinapisms and brushes. The patient could sit up, and drank without difficulty what was offered to him. On my asking him if he did not wish to pass water, he said to me softly, "The urine passes in the bed." All the organs of sense discharged their functions normally, except that the sensitive power of the skin was blunted.

When the patient perceived and recognized me, he manifested joy, it is true; but the idea that he must die, and soon be dissected, predominated long, and he spoke only of it, and took leave of those present. By continued conversation, and the introduction of harmless jokes, we succeeded, however, in drawing him from this idea, and leading him into conversation, when he very soon became cheerful, even joked about himself and others, talked incessantly, communicating the most secret thoughts of his heart, and could not refrain from expressing what he thought of others. Only occasionally did the current of ideas which he could not control overcome him to such an extent that he lost consciousness, so far as not to mind anything about him, not to answer questions or remarks addressed to him, losing himself in a disordered train of thought. However, this state lasted only some minutes, and the power of observing and rightly estimating external impressions again returned. The notion that he must die came back, however, sometimes, and always bore such an intimate relation to the sinking and disappearance of the pulse, that from the commencement of the latter phenomenon, I could with certainty reckon on the invasion of the thoughts of death, and, *vice versâ*, from the manifestation of the latter idea, I could anticipate the fall of the pulse. It seemed in the current of uninterrupted speaking, that the mass of ideas and images pressing on one another in the most rapid succession was much too great to admit of the possibility of their being clothed in words. Out of the chaos of ideas the notion often rose that our condition shall be eternal. He was also much occupied with the thought that he knew not whether he existed, or whether man in general existed, or for what purpose he existed. He acknowledged that it was impossible for him to keep anything secret, and stated that he could, therefore, not avoid exhibiting his character as it really was.

When the servant rushed breathless into my room, and summoned me to Dr. Heinrich, who, he said, was dying, my first idea was that other narcotics or acrid poisons besides *Cannabis Indica* must be contained in the Birmingi to have produced such violent indications of poisoning, for it did not appear to me to be probable that Indian hemp should, in the dose the patient had got, give rise to such severe symptoms. My mind was, therefore, very much eased to find, as I at once inferred on investigating the patient's state, that neither any other narcotic nor acrid poison was in operation; for neither opium nor any of its active constituents could be contained in the preparation, as the symptoms of opium-poisoning, such as they must have manifested themselves with this enormous depression of the action of the heart and vascular system, in deep coma, with stertorous and slow respiration, were absent. Nor could belladonna, stramonium, or hyoscyamus have been mixed with the Birmingi, as the essential phenomena belonging to these three narcotics—enormous dilatation of the pupil, even on exposure to a very dazzling light, unusual dryness of the organs of deglutition, hoarseness, raging delirium, or coma, the peculiar character of the pulse indicative of the ingestion of those narcotics—were wanting. Still less was there reason to suspect that tobacco, hemlock, digitalis, aconite, or cantharides —which, it is said, are sometimes added to hachisch to excite the sexual organs— had been taken, as the symptoms characteristic of these drugs were absent. For though individual phenomena, as the extremely depressed action of the heart and vessels, which are among the effects of the last-named narcotics, existed, yet the other

symptoms were not observed; and the symptom which is common to both was so far distinguished, as digitalis and aconite produce a constant retardation of the pulse, which lasts several hours, with occasional intermission of the beat, while here this condition alternated with increased frequency; not to mention the so characteristic exaltation of the cerebral functions, which latter, in cases of poisoning with digitalis and aconite, either remain quite unaltered, or manifest only extremely inconsiderable alienations. The absence of all phenomena appertaining to inflammation of the urinary organs was conclusive against the idea of poisoning with cantharides. Nothing, therefore, remained but to attribute the entire group of symptoms to the administration of hachisch, consisting exclusively of Indian hemp.

The characteristic feature of the above case of poisoning with hachisch consists in the extreme and persistent depression of the action of the heart and entire vascular system; and in the simultaneous lowering of the feeling of life, and the consequent fear of death, after the previous stage of excitement had lasted but a short time. The stage of depression alluded to is also characterized, however, by the absence of tendency to sleep, and by its long duration, in which this case differs from all the experiments I had made with Indian hemp and its preparations. In this respect this case contrasts directly with that I have communicated in my *Lehrbuch der Pharmakologie*, where a concentrated infusion of *Cannabis Indica* had given rise to an extremely acute and uncommonly intense attack of insanity, with destructiveness; which, however, quickly passed off, without leaving behind it any great depression; for even on the next day, the person experimented on having had a good night's sleep, felt perfectly well, while in Dr. Heinrich's case, the first night was wholly sleepless, and very considerable muscular debility, with determination to the head, continued until the third day. But it agrees with all our experiments and observations in this, that no trace of convulsion was manifested, for the slight degree of tremor which was present cannot be regarded as convulsion, inasmuch as the free influence of the will continued undisturbed, even in the limbs affected with tremor. However, convulsions occur very rarely, though there is no lack of observers who make mention of such, and even of cataleptic fits, after the use of hachisch. The above two cases, therefore, illustrate, in a remarkable degree, these two stages of intoxication—the stage of exaltation predominating in the one, and that of depression in the other.

Further, the case above communicated affords a fresh support to the view that Indian hemp, and the preparations derived from it, in general far exceed every other of the agents hitherto known which are more nearly connected with the cerebral functions in their immediate action on the imagination. With no other phrenic agent does the mental self-consciousness, the psychical coenæsthesia, the spiritual self-contemplation, come forward so freely as with this; with none does the current of the inner ideal world break forth so powerfully and impetuously as here, without the possibility of attending to external excitement and the corresponding reaction being removed. In a person intoxicated with alcohol, opium, &c., there is in the stage of exaltation an increase of the bodily coenæsthesia, but only exceptionally, and for a very short time, does this amount to internal contemplation, and it very soon passes completely into the stage of depression. With Indian hemp, the clear, reflective insight, the self-contemplation occurs as a persistent, essential effect, which is even still maintained when, with respect to the body, activity in all irritable forms is much diminished. And thus is explained the very great variety which exists in the psychical phenomena, according to the difference in the peculiarity, in the special psychical character, in the degree of spiritual development, and the occasional disposition of the mind and humour of the individual, as well as, on the other hand, according to the degree of material change produced by the poison. Hence the eastern Mahometan, who yields himself wholly to the sensual enjoyment of love, passes into the most voluptuous fancies; while the physician and psychologist, inclined to reflection on his bodily and mental existence and action, more closely examines and dissects his corporeal and mental organism.

The same variety of action, thus manifested in the physiological, is also specially exhibited in the pathological condition. Thus, I have seen patients take from one to ten, or, in one case, even so much as thirty grains of the alcoholic extract of *Cannabis Indica* in the course of an evening and night, sometimes within a few hours, without producing any particular symptoms, except some determination to the head; even the so much wished-for sleep, on account of which the remedy was taken, was not

obtained; while, in other cases, one grain of the same preparation, from the same source, produced violent symptoms, bordering on poisoning—delirium, very rapid pulse, extreme restlessness, and, subsequently, considerable depression. I must, therefore, in conclusion, repeat the opinion I expressed at the commencement of this paper—in support of which the members of the Society present, to whom I orally related the above described case, quoted numerous proofs from their practice—that Indian hemp, and all its preparations, exhibit the greatest variety in the degree and mode of action, according to the difference of individuality, both in the healthy and diseased condition; that they are, therefore, to be classed among uncertain remedies, and that the physician must, in every instance, use them with great caution.—*Dublin Quarterly Journal of Medical Science.*

ON THE VEGETABLE STRUCTURES IN COAL.

BY J. W. DAWSON, L.L.D., F.G.S.,
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After referring to the labours of others in the elucidation of the history of coal, the author remarks that in ordinary bituminous coal we recognize by the unaided eye laminæ of a compact and more or less lustrous appearance, separated by uneven films and layers of fibrous anthracite or mineral charcoal. As these two kinds of material differ to some extent in origin and state of preservation, and in the methods of study applicable to them, he proceeds to treat of his subject under two heads:—1st. The structures preserved in the state of mineral charcoal. This substance consists of fragments of prosenchymatous and vasiform tissues in a carbonized state, somewhat flattened by pressure, and more or less impregnated with bituminous and mineral matters derived from the surrounding mass. It has resulted from the *subaërial* decay of vegetable matter; whilst the compact coal is the product of *subaqueous* putrefaction, modified by heat and exposure to air. The author proceeded (after describing the methods used by him in examining mineral charcoal and coal) to describe the tissues of Cryptogamous plants in the state of mineral charcoal. Among these he mentions *Lepidodendron* and *Ulodendron*, also disintegrated vascular bundles from the petioles of Ferns, the veins of Stigmarian leaves, and from some roots or stipes. He then describes tissues of Gymnospermous plants in the state of mineral charcoal; especially wood with discigerous fibres and also with scalariform tissue, such as that of *Stigmaria* and *Calamodendron;* and the author remarks that probably the so-called cycadeous tissue hitherto met with in the coal has belonged to *Sigillariæ.*

The next chief heading of the paper has reference to structures preserved in the layers of compact coal, which constitutes a far larger proportion of the mass than the mineral charcoal does. The laminæ of pitch or cherry-coal, says Dr. Dawson, when carefully traced over the surfaces of accumulation, are found to present the outline of flattened trunks. This is also true to a certain extent of the finer varieties of slate-coal; but the coarse coal appears to consist of extensive laminæ of disintegrated vegetable matter mixed with mud. When the coal (especially the more shaly varieties) is held obliquely under a strong light, in the manner recommended by Goeppert, the surfaces of the laminæ of coal present the forms of many well-known coal-plants, as *Sigillaria*, *Stigmaria*, *Poacites* (or *Nœggerathia*), *Lepidodendron*, *Ulodendron*, and rough bark, perhaps of Conifers. When the coal is traced upwards into the roof-shales, we often find the laminæ of compact coal represented by flattened coaly trunks and leaves, now rendered distinct by being separated by clay.

The relation of erect trees to the mass of the coal, and the state of preservation in which the wood and bark of these trees occur,—the microscopic appearances of coal,—the abundance of cortical tissue in the coal, associated with remains of herbaceous plants, leaves, &c., are next treated of.

The author offers the following general conclusions:—

(1.) With respect to the plants which have contributed the vegetable matter of the coal, these are principally the *Sigillariæ* and *Calamiteæ*, but especially the former.

(2.) The woody matter of the axes of *Sigillariæ* and *Calamiteæ* and of coniferous trunks, as well as the scalariform tissues of the axes of the *Lepidodendreæ* and *Ulodendreæ*, and the woody and vascular bundles of Ferns, appear principally in the state of mineral charcoal. The outer cortical envelope of these plants, together with such portions of their wood and of herbaceous plants and foliage as were sub-

merged without subaërial decay, occur as compact coal of various degrees of purity, the cortical matter, owing to its greater resistance to aqueous infiltration, affording the purest coal. The relative amounts of all these substances found in the states of mineral charcoal and compact coal depend principally upon the greater or less prevalence of subaërial decay occasioned by greater or less dryness of the swampy flats on which the coal accumulates.

(3.) The structure of the coal accords with the view that its materials were accumulated by growth without any driftage of materials. The *Sigillariæ* and *Calamiteæ*, tall and branchless, and clothed only with rigid linear leaves, formed dense groves and jungles, in which the stumps and fallen trunks of dead trees became resolved by decay into shells of bark and loose fragments of rotten wood, which currents must have swept away, but which the most gentle inundations, or even heavy rains, could scatter in layers over the surface, where they generally became imbedded in a mass of roots, fallen leaves, and herbaceous plants.

(4.) The rate of accumulation of coal was very slow. The climate of the period, in the northern temperate zone, was of such a character that the true conifers show rings of growth not larger, or much less distinct, than those of many of their northern congeners.* The *Sigillariæ* and *Calamiteæ* were not, as often supposed, succulent plants. The former had, it is true, a very thick cellular inner bark; but their dense woody axes, their thick and nearly imperishable outer bark, their scanty and rigid foliage, would indicate no very rapid growth. In the case of *Sigillariæ*, the variations in the leaf-scars in different parts of the trunk, the intercalation of new ridges at the surface representing that of new woody wedges in the axis, the transverse marks left by the successive stages of upward growth, all indicate that at least several years must have been required for the growth of stems of moderate size. The enormous roots of these trees, and the conditions of the coal-swamps, must have exempted them from the danger of being overthrown by violence. They probably fell, in successive generations, from natural decay; and, making every allowance for other materials, we may safely assert that every foot of thickness of pure bituminous coal implies the quiet growth and fall of at least fifty generations of *Sigillariæ*, and therefore an undisturbed condition of forest-growth enduring through many centuries. Further, there is evidence that an immense amount of loose parenchymatous tissue, and even of wood, perished by decay; and we do not know to what extent even the most durable tissues may have disappeared in this way; so that in many coal-seams we may have only a very small part of the vegetable matter produced.

Lastly. The results stated in this paper refer to coal-beds of the middle coal-measures. A few facts which I have observed lead me to believe that in the thin seams of the lower coal-measures remains of *Nœggerathia* and *Lepidodendron* are more abundant than in those of the middle coal-measures.† In the upper coal-measures similar modifications may be expected. These differences have been to a certain extent ascertained by Goeppert for some of the coal-beds of Silesia, and by Lesquereux for those of Ohio; but the subject is deserving of further investigation, more especially by the means proposed in this paper, and which I hope, should time and opportunity permit, to apply to the seventy-six successive coal-beds of the South Joggins.—*Geological Society.—Annals of Natural History.*

SUPPLY OF COAL.

M. de Carnal, one of the greatest owners of coal mines in Prussia, in a statistical work on coal digging, states that the quantity of coal dug in 1857 amounted to 125,000,000 of tons, a mass which, piled up 6 feet high, would cover a geographical square mile. The lands from which the coal is procured may be estimated at 8000 square miles, and the mean depth of the beds of coal at about 31 feet. The mass of coal then known to exist would form a cube of 10 miles. If we compare this enormous bulk of coal with the quantity annually consumed, we may confidently affirm that there is enough to last for 36,000 years. The calculation of 31 feet for the mean depth of the beds is perhaps too low, for the coal fields of Liège extend 55 feet, those of Staffordshire to 151 feet, and those of Ruhr to 134 feet. The coal dug in 1857 amounted in value to £37,500,000 sterling, a sum far beyond that realized by

* Paper on Fossils from Nova Scotia, Proc. Geol. Soc. 1847.

† I may refer to my late paper on Devonian Plants from Canada for an example of a still older coal, made up principally of remains of Lycopodiaceous plants of the genus *Psilophyton*.

the digging of the precious metals. In England some calculations have been made with regard to the yield of coal in our own country, according to which the coal fields of Great Britain yield 63,000,000 tons of coal per year. A better idea of the immense commerce of England could not be formed than by stating the fact, that at Manchester and its environs, a motive steam power equal to 1,200,000 horses is constantly maintained, to support which there are consumed 30,000 tons of coal per day, or 9,500,000 a year. In the manufacture of salt alone about 3000 tons are consumed per day, or 950,000 a year. The Transatlantic steamers from Liverpool and other ports consume 70,000 tons per year, and the manufacture of gas absorbs 10,000,000 tons per year. The export of coal from England reached, in 1858, 6,078,000 tons. It is estimated that England alone could furnish enough coal for the consumption of the whole of Europe for 4000 years.—*Journal of the Society of Arts.*

NOTE ON THE SPECIES OF *CROTON* DESCRIBED BY LINNÆUS UNDER THE NAMES OF *CLUTIA ELUTERIA* AND *CLUTIA CASCARILLA.*

BY JOHN J. BENNETT, ESQ., F.R.S., SEC. L.S.

During a late residence in the Bahama Islands, the attention of our indefatigable member, Dr. W. F. Daniell, was especially directed to the species of *Croton* growing in those islands; and I am enabled, by his kind communication of the specimens collected by him, to clear up much of the obscurity in which the species furnishing the Cascarilla-barks of commerce have been involved. I willingly leave in his own able hands that portion of the subject which relates to the Materia Medica and the commercial history of the Barks in question, and shall limit myself, in the present brief notice, to the botanical history and discrimination of the species which have been confounded together under the specific names of *Eluteria* and *Cascarilla.*

The first account given by Linnæus of *C. Eluteria* occurs in 'Hortus Cliffortianus' (1737), pp. 486-7. Of the plant there carefully described, an authentic specimen exists in Cliffort's herbarium in the British Museum, with a portion of the description attached in Linnæus's own hand, and marked with the only synonym quoted :— "*Cortex Ilatheria.* Elutheria Provid. folio cordato subtus argenteo. Sweet bark, s. cortex bene olens. Petiv. Collect. p. 4, n. 276." The synonym; the habitat, "crescit in Insula Providentia;" and the name *Elutheria*, derived from the adjacent island of Eluthera, all bespeak its Bahamian origin. Of this very distinct species, a specimen brought from the Bahamas forms part of Catesby's collections in the British Museum; and there also exists, in the Banksian herbarium, a similar specimen of Catesby's from Gronovius, together with specimens from the herbarium of Phillip Miller, from the "Bahama Islands, Long Island," collected by Peter Dean, Esq., in 1788; and from the "southern parts of North America," collected by André Michaux, the latter sent under the erroneous name of *Croton Cascarilla.* Linnæus himself never possessed a specimen; and having, apparently, entirely forgotten its characters, he referred to it in his 'Flora Zeylanica' (1748), No. 366 (with several other equally erroneous synonyms), the *Mahapatigaha* of Hermann's 'Museum Zeylanicum,' of which no specimen existed in Hermann's collections, and added the officinal synonym of *Cascarilla.* Of the additional synonyms, that quoted from Breynius, Plukenet, and Seba, unquestionably belongs to the plant subsequently named by Jaquin *Croton niveum*, and that of Plumier and Catesby, as we shall hereafter see, is the foundation of Linnæus's own *Clutia Cascarilla.* In his 'Materia Medica,' published in the following year, he ascribes the Cascarilla bark to the *Eluteria* of his 'Flora Zeylanica,' with the single synonym of Catesby; while in the first edition of 'Species Plantarum,' published in 1753, he quotes, under *Clutia Eluteria*, his 'Flora Zeylanica' and 'Materia Medica,' *Eluteria* of 'Hortus Cliffortianus,' and the mistaken synonym of Plukenet and Seba. Of all these, it is evident that the only true synonym is that of 'Hortus Cliffortianus,' from which the name of the species was derived.

Up to this time Linnæus had in his own herbarium no specimen referred to *Clutia Eluteria*, and there is no indication by which it can be positively determined whence and at what period the specimen which he subsequently designated by that name was obtained. It appears probable, however, that it was one of the Jamaica specimens received by him from Patrick Browne, and described in his 'Pugillus

Plantarum Jamaicensium' (1759), inserted in the fifth volume of his 'Amœnitates Academicæ.' The description which he there gives (p. 411) of *Clutia Eluteria* is quite inapplicable to the original plant, and exactly agrees with this specimen. In the second edition of 'Species Plantarum,' he refers to this description, adds Patrick Browne's synonym, and retains that of 'Hortus Cliffortianus,' as well as the erroneous reference to Plukenet and Seba. It is only necessary to add that in Swartz's 'Flora Indiæ Occidentalis' (p. 1183), Patrick Browne's plant is properly referred to the genus *Croton*, and is carefully described, under the name of *Croton Eluteria*, as synonymous with *Clutia Eluteria*, L., and that a figure of the true or Bahamian species, taken from one of Mr. Dean's specimens in the Banksian herbarium, is given in Woodville's 'Medical Botany,' t. 223, together with a sketch of a miserable scrap of the Jamaica plant from a specimen communicated to the same herbarium by Dr. Wright, who, in the eighth volume of the 'Medical Journal,' describes it as producing "the Cascarilla or Elutheria of the shops."

I now turn to the second species, *Clutia Cascarilla*, L. Linnæus had originally no knowledge of this species, except that which he derived from the figure of Catesby and the synonym of "*Ricinoides* elæagni folio," quoted by Catesby from Plumier; and both of these he referred, in his 'Flora Zeylanica,' to the confused heap there collected under the head of *Eluteria foliis cordato-lanceolatis*. The same confusion between the Bahamian and the Ceylonese species was continued in his 'Materia Medica;' but in the first edition of 'Species Plantarum' he distinguished the plant figured by Catesby under the name of *Clutia Cascarilla*,—mistaking, however, the habitat, which Catesby indicates as the Bahamas, and substituting Carolina in its stead. As he denotes by his usual symbol (†) that he had never seen this species, and quotes no other synonym than that of Catesby, there can be no question that the species is wholly founded on the figure and description of that author, both of which are remarkably good representations of a plant of which Dr. Daniell has brought home excellent specimens, and which (as far as I am aware) has never before been forwarded to European herbaria. Catesby's description is as follows:—"The Ilathera bark; *La Chachrille*. These shrubs grow plentifully on most of the Bahama Islands, seldom above ten feet high, and rarely so big as a man's leg, though it is probable that, before these islands were exhausted of so much of it, that it grew to a larger size; the leaves are long, narrow, and sharp-pointed, and of a very pale light-green colour; at the ends of the smaller branches grow spikes of small hexapetalous white flowers, with yellow apices, which are succeeded by tricapsular pale-green berries, of the size of peas, each berry containing three small black seeds, one in every capsule. The bark of this tree, being burnt, yields a fine perfume; and, infused in either wine or water, gives a fine aromatic bitter."

As in the former case, it was not until after the publication of the species in the first edition of his 'Species Plantarum,' that Linnæus became possessed of a specimen totally different from the original plant, but which he nevertheless referred to it. The same concurrence of circumstances as in the former case leads me to believe that this also was received from Dr. Patrick Browne. It perfectly agrees with the description of *Clutia Cascarilla* given in the same Dissertation in the 'Amœnitates Academicæ,' vol. v. p. 411, with the synonym of Browne, and with the figure of Sloane's 'History of Jamaica,' there quoted, and is the "Wild Rosemary" of most of the West Indian Islands, subsequently described by Jacquin under the name of *Croton lineare*—a name, which has since been generally, but erroneously, considered as synonymous with the *Clutia Cascarilla* of Linnæus.

It only remains to formularize these details, with the addition of discriminative characters, premising that both the original species and those which have been substituted for them are true Crotons, in the comprehensive sense in which that genus is still maintained.

1. Croton eluteria, foliis petiolatis subcordato-lanceolatis obtuse acuminatis supra viridibus squamulis peltatis raris punctatis subtus dense argenteo-lepidotis lucidis, spicis simplicibus axillaribus terminalibusque monoicis.

Elutheria Providentiæ, folio cordato subtus argenteo. Sweet Bark, s. cortex bene olens. *Petiv. coll.* 4, n. 276.

Eluteria, *L. Hort. Cliff.* p. 486!

Clutia Eluteria, *L. Sp. Plant*, ed. 1. p. 1042 *(excl. synon. omn. præter Hort. Cliff.)*.

Clutia Eluteria s. Cascarilla, *Woodv. Med. Bot.* p. 633, t. 223. f. 2!
Hab. In Insulis Bahamensibus, *Catesby! Dean! Dr. W. F. Daniell!*

2. Croton cascarilla, foliis petiolatis anguste lanceolatis utrinque attenuatis acutis margine planis v. subundulatis supra viridibus glabris subtus pallidis pilis stellatis intricatis dense vestitis, spicis simplicibus terminalibus monoicis.
Ricinoides elæagni folio, *Plum. Spec.* 20 ; *Icon.* p. 236, t. 240. f. 1 ; *Catesby Carol.* vol. ii. t. 46.
Clutia Cascarilla, *L. Sp. Pl.* ed. 1. p. 1042.
Hab. In Insulis Bahamensibus, *Catesby ;* "Providence," *Dr. W. F. Daniell!*

3. Croton lineare, foliis subsessilibus linearibus obtusis margine plus minus reflexis supra viridibus glabris subtus pallidis pilis stellatis intricatis densissime vestitis, spicis simplicibus axillaribus terminalibusque dioicis.
Ricino affinis odorifera fruticosa major, rosmarini folio, fructu tricocco albido, *Sloane, Hist. Jam.* i. p. 133, t. 86. f. 1!
Croton fruticulosum ; foliis longis, angustis, subtus incanis margine reflexis, *Browne, Jam.* p. 347.
Clutia Cascarilla, *L. Amœn. Acad.* v. p. 411 ; *L. Herb.* !
Croton lineare, *Jacq. Amer.* p. 256, t. 162. f. 4 ; *Pict.* p. 124, t. 263. f. 80.
Croton Cascarilla, *Woodv. Med. Bot.* p. 629, t. 222.
Hab. In Ins Jamaica, *Sloane! Houstoun! Wright!*; in Insulis Bahamensibus, *Catesby! Dr. W. F. Daniell!*

4. Croton Sloanei, foliis petiolatis ovatis obtusis v. obtuse acuminatis perforatis squamulis peltatis supra raris infra numerosis adspersis, spicis compositis axillaribus terminalibusque monoicis.
Mali folio arbor artemisiæ odore et flore, *Sloane, Jam.* ii. p. 30, t. 174. f. 2 !
Clutia Eluteria, *L. Amœn. Acad.* v. p. 411 ; *L. Herb.* !
Croton Eluteria, *Swartz, Fl. Ind. Occid.* p. 1183 ; *Wright,* in *Med. Journ.* viii. p. 3! *Woodv. Med. Bot.* p. 634, t. 233. f. 1 (*pess*)! *Hayne, Arzneygew.* xiv. t.
Hab. In Ins. Jamaica, *Sloane! Wright!*

These four species are so totally distinct, that, when once discriminated, they can never again be confounded. In addition to the three former, Dr. Daniell's collection from the Bahamas contains specimens of *Croton lucidum*, L., and *Croton balsamiferum*, Jacq.—*Journal of the Linnean Society.*

THE EMPLOYMENT OF WATER IN AUSCULTATION.

BY S. SCOTT ALISON, M.D.,
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The Hydrophone.—If we desire to employ water as an agent in auscultation and in aid of hearing-tubes, difficulties at once present themselves. To apply water to the chest is easy enough; but it is not so easy to retain it there in a suitable manner. The application of water may be unpleasant to the patient, and by wetting his clothes may give rise to much annoyance and inconvenience. The idea occurred to me that if I could confine water in some material that would not interfere with its sound-intensifying power, a material advantage would be gained, and we should have a convenient mode of reinforcing hearing-tubes. In a former paper it was stated that a thin membrane offers no sensible impediment in the way of water intensifying sound, although thick and non-elastic or non-vibrating bodies did, and taking advantage of this fact, I made a waterproof bag of india-rubber to contain water. The india-rubber membrane is so thin as to offer little or no resistance to the undulations of water. The bag is about the size of a large watch, and is sufficient to receive the extremity of an ordinary flexible stethoscope, or to form a medium of connexion between the external ear and a solid sounding body such as the human chest. The thickness of the bag is not above the third of an inch. Nothing is gained by greater thickness, and the advantages of sound having to travel only a short way, and also of only a very little weight pressing upon the sounding body, are secured. The sonorous pulses, so to speak, are readily taken up from the solid body or the chest, and are conveyed through the water, and membrane on either side,

and reach the edge of the aperture of the hearing-tube and the contained air, whether the instrument be the flexible stethoscope, the human ear, or any other hearing-tube. This instrument possesses valuable advantages, and I have therefore ventured to give it a name, that of the Hydrophone. It fits admirably and exactly upon the part of the chest to which it is applied, however uneven and irregular, whether this be a projecting rib or a deeply sunk intercostal space, a broad level surface or a narrow depression, the clavicle or spine of the scapula. By its other side the hydrophone fits as exactly to the aperture of the hearing-tube or to the exterior of the human ear. Every part of the solid body covered by the hydrophone contributes its quota of sound. The fitting of the instrument to the hearing-tube prevents the escape of sound from the contained air to the external atmosphere, and by this means resonance of the contained air, and of the containing tube, is greatly promoted, with the result of a greatly augmented sound. The edge of the hearing-tube sits so easily, and with so little resistance from the water-bag, or hydrophone, that the vibrations which are communicated to it are readily reciprocated, and find none or little of that resistance so fatal to its vibrations when pressed upon a solid body.*

The hydrophone may be employed either in aid of the stethoscope, or as a distinct acoustic instrument by itself. In the case of wooden stethoscopes which are solid, applied to the distal aperture, it is injurious by damping sound ; in the case of the hollow wooden stethoscope it is of no material value, for water is an indifferent conductor of sound from a solid body to another solid body, and it may be stated that the hollow wooden stethoscope is more a solid than an air instrument. What it gains as an air instrument from the water, is lost as a solid instrument. In fact, more may be lost in the one way than is gained in the other.

It is in the case of the flexible stethoscope that the hydrophone forms a material aid in auscultation by hearing-tubes. The flexible stethoscope is here meant to signify all stethoscopes into whose construction flexible tubes enter, either forming the whole tube part of the instrument, as in the ordinary flexible stethoscope, or part only, as in Camman's double stethoscope, or my own differential stethoscope. These instruments are essentially air instruments, and I am glad to say that Camman designated his instrument such when he first made it known ; for this corresponds with my own investigations. In the case of all these instruments the intensification of sound by the hydrophone is so material, that I have no hesitation in saying that without its employment their resources are by no means fully made available. To have the full benefit of any one of these instruments the hydrophone is essential. Respiratory sounds, healthy and morbid, which are audible with the simple flexible stethoscope, are made more audible when the hydrophone is placed under it. Rhonchi and moist crepitation are strikingly augmented. Vocal resonance, solid and cavernous, dry and moist, are in a marked manner amplified. Pectoriloquy, accompanied with much vibration of the chest, is increased in a very striking manner. Murmurs of the heart, usually heard in a mitigated form only by flexible stethoscopes—at least in my experience—are conveyed to the ear so as to produce a very distinct and defined sensation. To sum up, it appears to me that flexible stethoscopes, however

* A fact which I have very lately ascertained appears to me well worthy of being here recorded. It bears directly upon the importance of perfect freedom of the cup of flexible stethoscopes. A cup held rather firmly upon a piece of wood upon which a tuning-fork is placed gives a fainter auditory sensation than when held loose, but the auditory sensation is further and very materially reduced, if, instead of being held firm, the cup be glued to the piece of wood. Here we have perfect continuity but reduced sound. The explanation is found in the reduced vibration.

ingeniously constructed with twisted wire and other contrivances, are, compared with the simple wooden stethoscope, essentially deficient as sound-conveying instruments, some few sounds excepted; but that the hydrophone greatly counteracts this deficiency and brings them up much more to the rank of Lænnec's stethoscope. But the inquiry may be made,—What good purpose can the hydrophone subserve under such circumstances, if it can only bring a second-rate instrument nearly up to the position of another? The answer is this,—There are situations and occasions which require the flexible instruments, as is well known, and it is certainly important to render them, defective though they are, as useful acoustic instruments as is possible. It may be possible to place the cup of a flexible tube with a hydrophone under it, where it would be difficult or impossible to employ a wooden stethoscope. In auscultating the sounds of the gravid uterus, or of the fœtus in process of birth, a flexible stethoscope with a hydrophone might possibly afford evidence that would under certain circumstances be very important.

Pulsating tumours of the chest, too tender to admit of the pressure of the wooden stethoscope, or even of the naked cup of the flexible stethoscope, or upon which it might be dangerous or hazardous to exercise pressure, are well auscultated by means of the flexible stethoscope, provided either with a flat ear-piece or a tubular ear-piece to enter the meatus, having the hydrophone placed under it and upon the morbid part. The hydrophone takes up sound from every part, however uneven it may be, it forms a soft water cushion, and it serves, at the same time, greatly to reinforce sound procured without it. In practice I have on many occasions, with the aid of the hydrophone, distinctly heard murmurs of the heart, of the existence of which I had been in doubt when simply employing the flexible stethoscope.

I have observed that when the flexible stethoscope is employed with the clothes of the patient intervening, as is unavoidable under some circumstances, as, for instance, when time does not admit of undressing, or when the patient would suffer by exposure to cold, the impression made upon the ear by lung and heart sounds is greatly enfeebled and is very unsatisfactory. This evil attendant upon the employment of the flexible stethoscope, including Camman's double stethoscope, and my own differential stethoscope, is obviated, I may say altogether, by placing the hydrophone under the stethoscope. The reinforcement of the sounds is so great as to be quite surprising, as well as very useful. An examination that would be worthless is by the use of the hydrophone rendered satisfactory. This result is obtained partly by a gentle yet efficient pressure exerted upon the clothes, compressing them into less density by excluding layers of air. But a great portion of the result is due to a more complete closure of the aperture of the instrument, attained by a surface of water covered by thin membrane, than can be secured by one of porous and comparatively uneven cloth, &c.

In the examination of children, the employment of the hydrophone, together with the double or the differential stethoscope, is most satisfactory, and is well deserving of notice here. I believe it to be a very great improvement upon the use of the wooden stethoscope, and well worthy of the adoption of the profession in dealing with children. The intensity of sound procured is nearly the same as in the case of wooden instruments. The cup of the stethoscope fits perfectly upon the water, which it can seldom do upon the sharply-curved chest of infants, and thus much economizing of sound is secured. For the same reasons no irregular pressure is endured. The child suffers no pain, and is spared one great source of restlessness and vociferation. Lastly, the employment of the hydrophone and a flexible stethoscope causes no alarm, as in the case of the wooden instrument, and is very generally the source of much interest and even amusement to the child, who consequently remains in a state of quietude very favourable for the examination of the auscultator. I constantly examine children with the utmost ease and deliberation in this way, whom I should otherwise have to send away after fruitless efforts at auscultation.

The same method of examination, viz. by the hydrophone and the flexible stethoscope, including Camman's double stethoscope and my differential stethoscope, is very valuable in the case of wasted patients. The employment of the wooden stethoscope with such persons is frequently very painful, and is positively cruel. Moreover, as the aperture fits very badly, it is highly unfavourable for the propagation of sound to the ear. Now, the water-pad, or hydrophone, sinks into the hollowed intercostal spaces, and comes into complete contact with the entire circum-

ference of the mouth of the stethoscope, at once collecting more sound, preventing its escape, and obviating the occurrence of painful pressure.

Upon blistered surfaces and parts tender either from internal disease or from external applications, this mode of auscultation is much superior to that by the wooden stethoscope. When an examination by the latter instrument is positively refused, one by the method under consideration is at once permitted as being altogether painless. Many patients, particularly females with tender and wasted chests, have expressed to me their satisfaction with, and surprise at, this painless mode of examination.

A very slight augmentation of sound, in the case of some sounds, is procured by placing the hydrophone on the proximal or aural extremity of the ordinary wooden stethoscope, but it is scarcely available in practice.

The bag of water, or hydrophone as I have ventured to call it, is of service, not only in the case of artificial hearing-tubes, but in that of the natural hearing-tube, viz. the ear. Applied to the naked chest it forms a stethoscope not materially inferior to the best wooden stethoscope, length excepted. When the part auscultated is very uneven or much curved, by fitting well, it excels the wooden instrument in an acoustic point of view. By fitting well, also, upon the external ear of the auscultator, and by closing thoroughly the meatus externus, great acoustic advantages are obtained. The sonorous undulations are freely conveyed to every part of the external ear, the air in the meatus comes in immediate contact with the instrument without the possibility of any sonorous undulations escaping. The sonorous undulations of the walls of the tube and those of the enclosed air re-act upon each other. The water again reciprocates as a sounding-board, and the general resonance is greatly promoted by the thorough closure of the tube. The closure of the meatus is greatly more complete in the case of the water-bag than can be procured by any ordinary wooden disc. The complete closing of the ear, it may be remarked, is useful chiefly by promoting resonance, and not, as has been erroneously taught by some eminent stethoscopists, by excluding other sounds.

The hydrophone forms a great aid to the external ear when the patient is to be examined with his clothes still upon him. As a general rule, good stethoscopists strip their patients for examination, but it may be sometimes desirable to examine through their clothes, as in probably trivial cases, when there is little time, when the patient suffers from cold, or when the examination is only a supplementary one, or a rough observation will suffice. In such an examination the hydrophone proves of great value: a sound which is very indistinct to the ear placed upon the clothes, becomes full and distinct when the hydrophone is employed. Voice sounds, heart sounds, and rhonchi, are greatly improved. Employed in this manner, I am inclined to think the hydrophone is equal, if not superior, to the wooden stethoscope.

The water instrument has this material advantage, that it is very readily moved from one place to another—*i.e.* from one part of the chest to another. For example, in examining the back, the whole of the surface may be, as it were, run over without once lifting the head, the hydrophone being shifted with the ear upon it from place to place.

In respect of delicacy, the hydrophone is not without some value, for, in the case of females, the interposition of this instrument meets the objection to the immediate contact of the ear of the auscultator with the chest of the patient. When the application of the hydrophone gives annoyance from its coldness, this evil may be readily obviated by placing the instrument in warm water, or by otherwise warming it. Minor advantages of this instrument are its portability and cleanliness.

Other liquids, besides water, tend to intensify sound proceeding from solid bodies, and conveyed to the ear by means of hearing tubes, but none experimented upon have given practically better results. Mercury gives an increase, and the character of the sound is heavy and forcible. Thick glutinous fluids, such as treacle and marmalade, and thick oils, give less increase than water; and much of the fine liquid, vibrating character of the sound, when passed through water, is lost.

Some solid bodies serve likewise to give a stronger auditory impression when placed upon other solid bodies, when hearing tubes are employed. Layers of paper, such as a pamphlet, layers of gutta percha membrane, and thin slices of India-rubber, lard, and butter, give an increase; but it is much less than is obtained from water. In the case of these solid bodies the augmentation is due to two circumstances: 1st, the exact fitting of the instrument upon them; 2nd, the greater amount

of its vibration in their case than in that of more solid and resisting bodies. Dr. Sibson has long employed a stethoscope closed with a thin plate of wood, with the effect of rendering valvular sounds more distinct.

That I may not appear intentionally to ignore anything that has been done by a professional brother, I deem it right to say, that a water stethoscope was invented some years ago; the name of the inventor I have been unable to discover. I have endeavoured to find some printed details of this instrument, but have failed. Dr. Hamilton Roe and Dr. Markham have informed me that they have seen an instrument so called. It is said to be a solid tube filled with water, but I cannot conceive it could afford any advantage. If water be made to fill the ordinary wooden stethoscopic tube, I am convinced the addition can only serve to spoil the instrument, for this reason—that water in the interior will interfere with the full vibrations of the wood. It is as an adjunct to hearing-tubes, or employed as the hydrophone, as previously described, that water can prove of service in ordinary auscultation.

Before concluding this communication, I may be permitted to refer to a point which, though not bearing immediately upon the employment of water in auscultation, yet has suggested itself to several professional friends—viz. the apparent contradiction offered to the sound-propagating properties of water, by the absence or deficiency of respiration and voice sounds in some examples of liquid in the chest, and of heart sounds in examples of effusion in the pericardium.

I would briefly remark, that though water is a good *conductor* of sound, second only to wood and other solid bodies, and better in the case of air-tubes as above described, it is yet in many cases opposed to the *production* of sound, and effectually prevents those movements upon which sound depends. A lung pressed upon by water till it becomes impervious to air is not likely to be the seat of respiration sounds, and if they are not produced inside, they cannot be heard outside. *Ex nihilo nihil fit.*

Besides this, the circumstances under which the liquid is situated in respect of the stethoscope or hearing-tube are different. The liquid in the chest is separated from the hearing-tube by the whole thickness of the walls of the cavity; while in the case of the hydrophone and of water employed in my experiments, the liquid is brought in immediate, or almost immediate, contact with the aperture of the stethoscope, a condition which, as was stated in a former communication, is essential to the procuring an augmentation of sound from solid bodies by the intervention of water.

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ON THE USE OF PIGMENTUM ALBUM IN SOME CUTANEOUS MALADIES.

BY ALFRED FREER, ESQ., M.R.C.S.

I WISH to call the attention of the profession to the great value of white paint as a remedial agent. The preparation itself is nothing more than a mixture of linseed oil and carbonate of lead, rubbed up into a semi-liquid substance. I first became acquainted with its great efficacy in the treatment of erysipelas by my late father and my brother. It is in this disease that the most striking benefit results from its application. I have never yet met with a case of this nature where it has not done immense good. I find it far superior to lead lotions, mucilage, hot fomentations, nitrate of silver, or collodion. After erysipelas, the paint proves of the greatest service perhaps in eczema in its several forms. In chronic eczematous eruptions of the aged it affords much comfort, and often speedily effects a cure. Of late years I have extended its employment to other complaints of the skin, including herpes in its several forms. I have tried it in some cases of small-pox, with the view of diminishing the number of vesicles on the face, and of controlling their size; the latter indication it seems likely to fulfil, but I cannot speak with confidence about the former, the papules being already numerous at the time of my visit. I have also used it in several cases of carbuncle and furuncle. The first was in an instance of a huge carbuncle situated on the loin of a man, and rapidly extending, notwithstanding free incisions, linseed poultices, and appropriate constitutional treatment.

applied a thick, wide circle of paint round the swelling, and dressed with resin ointment and cotton wool. There was no advance of the disease from that time, the centres rapidly broke up, and recovery took place. It is, however, probable that the omission of the warm poultice may have contributed to the improvement, for I have often observed that warm poultices, however well made, seem to foster and spread carbuncular inflammations.

The paint seems to act in two ways: first and chiefly, as an efficient excluder of the air—that great irritant to the cutaneous surface when disordered; and secondly, as a direct sedative to the sentient nerve filaments, rendering them less prone to become involved in inflammatory action. In boils it relieves the painful tension, and favours resolution. In some forms of painful ulcers of the leg, of a small size, it gives great relief. In galling of the skin, where anasarca is present, it is also of use; and is the best application that we have in burns of the first and second degree. But it is in erysipelas that its triumph is most manifest; the patient soon finds the comfort of it. The tight shining skin soon becomes wrinkled and shrunken, indeed, the inflammation very rarely extends after the second or third painting.

All my friends to whom I have recommended the pigmentum album speak highly of it, and one, who is a Surgeon in the Peninsular and Oriental Company's service, has used it for the last two years with great success. The manner of applying it is by means of a feather, painting the affected parts and *a little beyond*, and laying on a fresh coat every two hours or so, until a thick layer is obtained, and then sufficiently often to maintain a covering. In erysipelas it peels off in a week or so with the shed cuticle, leaving beneath a smooth, clean, healthy surface. Patients are struck with the benefit they derive from its employment.—*Dublin Hospital Gazette.*

ON PERCOLATION OR DISPLACEMENT.

BY WILLIAM PROCTER, JUN.

It has long been conceded that the process of displacement or percolation, as developed by the Boullays of Paris in 1833, is calculated, in proper hands, to work a complete revolution in the manipulations of extraction, as applied to pharmacy. Those who have understood it have not failed to get results, which, if not entirely satisfactory, have so far exceeded the ancient methods of maceration and digestion, that they have won for it the preference. Why then, it has been asked, has not this process been universally employed? Why, in two successive revisions of the Pharmacopœia, has it been but partially adopted, giving the preference to the old methods? I believe, the reason will be found in the fact that the practice of this process involves more preparatory labour and stricter attention to certain conditions, without which it is a failure; and that it was the want of confidence by the Pharmacopœial authorities in the ability and willingness of those who have in charge the business of pharmacy, faithfully to carry out these conditions, that caused percolation to be offered as an *alternative*, instead of being made the normal process of extraction. The very simplicity of maceration renders it easily understood by the novice, and any irregularity in the preparation of the materials is overcome, in a great degree, by the longer time devoted to the process.

Unfortunately, many persons who employ percolation habitually, do not understand its principles and details sufficiently clear to gain all the advantages it affords, or even to get products, in many cases, equal to those by the old methods. My attention has been reattracted to this subject, partly by the near approach of a new edition of our Pharmacopœia, and partly by the excellent paper of Prof. Grahame, read at the last meeting of the Association, at Washington, which has been reprinted on page 354 of the present number from the published Proceedings; and I propose first to consider what the displacement process was intended to accomplish, and the conditions to be attended to, and afterwards remark on the results of Prof. Grahame.

The object to be obtained in practice by Boullays' theory is this: a solvent, poured on the top of a powder consisting partially of soluble matter, contained in a cylindrical vessel and supported on a porous diaphragm, descends from layer to layer by capillary attraction, and its own gravity, exerting its solvent power on each suc-

cessive layer until its power of solution is exhausted, after which it continues to descend by the pressure of the superincumbent fluid, until forced out through the diaphragm into the vessel below, a saturated solution; this process continuing until the powder is exhausted of the soluble matter, and the liquid passes through holding less and less matter in solution. But to gain this result it is absolutely necessary that the substance treated shall be in *a uniform powder*, and that the *capillarity or porousness of the mass of powder be not destroyed by any cause whatever*, for, *on the fact of the slow, regular, and even descent of the solvent from one horizontal layer to the next*, without side channels or circuits caused by irregular powdering or imperfect packing, depends the success of the process. Now what are the causes which interfere with this important condition? They are several:—1. The imperfect preparation of the powder, owing to the difference of opinion as to the degree of fineness it should be made to assume, and to the careless dislike of the trouble it causes. To say that all substances should be equally fine would be incorrect, as in substances containing a large proportion of matter very soluble in the liquid used, the powder should not be quite so fine as in examples where the proportion is less, for the reason that the proper capillary action is interfered with. To give an extreme example in illustration, it would not be proper or possible to displace finely powdered gum or sugar with water, or guaiac or mastic with alcohol; but by associating with these powders a sufficient quantity of insoluble matter in powder, the condition of porosity being established, the process would go on. But the range of fineness should not be very great in small regular operations; and where the state of division is properly attended to, there need be no difficulty in regulating the porosity of the mass and consequent passage of the liquid.

It is an excellent custom to keep a set of sieves for the preparation of powders for this purpose, so that the degree of fineness of powders for percolation can be easily regulated; and it will be a point worthy of consideration by the revising committee of the Pharmacopœia, whether some more definite directions as regards the state of division of drugs for displacement cannot be given than at present: Dr. Squibb suggests that a sieve of 24 meshes to the linear inch produces a powder of the right fineness—Prof. Grahame considers the range should be from 40 to 60 meshes to the inch. I believe the range should be greater, to include large and small operations, 20 to 60 meshes to the inch. Where the menstruum is ethereal or alcoholic (50 to 95 per cent. in strength), the finer powder will be found very suitable, even in a cylindrical percolator, unless the powder is highly resinous; in which case, either the powder must be coarse, or, if fine, must be admixed with an inert powder like sand to give the requisite porosity. When, however, very dilute alcohol or water is used, a powder 40 to the inch will be found fine enough; and if the substance is mucilaginous, 25 to 30 meshes will be found sufficient. But whatever degree of division is adopted, let it be as uniform as possible, and not consist of fine cellular tissue mixed with long coarse fibres, the result of simple contusion, as is often the case. Until apothecaries will conscientiously assume this trouble and care, they will not be able to derive the beautiful and satisfactory results from this process which it so abundantly affords.

This brings us to the second stage of the process—viz. the manner of packing the material in the apparatus, as regards its condition of dryness or moisture at the time it is packed, and the form of the apparatus used. Boullay almost invariably recommended the powders to be packed dry—others dampen the powder, or even saturate it, by previous maceration. Our Pharmacopœia, based on the experience of many operators, almost invariably directs the powders to be previously macerated in a portion of the solvent. My own practice has been in favour of macerating the powders in all cases where the menstruum is water or very weak alcohol, where the powders swell by absorption; whilst with alcohol or ether, to proceed at once with the percolation, with or without previously moistening the powders at the time of packing, according to circumstances. Prof. Grahame invariably uses fine powders, and previously dampens them with menstruum, just sufficiently to facilitate (or invite, so to speak) the entrance and descent of the fluid through the powders, without destroying their pulverulent condition and interfering with their regular packing.

The degree of pressure to be exerted in compacting the powders must vary with

their nature ; hard ligneous substances will require more compaction than such as tend to expand by contact with fluid. There is a class of drugs, of which rhubarb and calumba are a type, which become adhesive by contact with water or weak alcohol, and constantly give trouble to the operator in the ordinary cylinder, owing to their tendency to swell up and form an impervious mass. It will be seen by the sequel that the employment of a conical percolator in great measure remedies this difficulty. There is another class that contain insoluble gum or mucus analogous to bassorin, like senna and althæa root, which swells up and forms a gelatinous mass with water, wholly unfit for percolation in an ordinary percolator. With the conical displacer, even these may be treated with an aqueous menstruum ; but unless the mucilage is desirable in the preparation, as in syrup of althæa, it is better to use a partially alcoholic menstruum. In those cases where the swelling is due more to the expansion of the cellular tissue of the particles by contact with water than to mucilage, even though a large amount of soluble extractive matter be present, as in the case of gentian, it will be found advantageous to use a fine powder, fifty or sixty to the inch, moistened with half its weight of water, which does not destroy its pulverulent condition, and treat it in a conical percolator. Prof. Grahame, having met with no difficulty on the score of compaction by swelling, overlooks this fruitful source of trouble in direct displacement with the ordinary cylinder, owing to his having accidentally employed the funnel as a convenient percolator, and his success with those substances that ordinarily require previous maceration to swell them is largely attributable to this cause. When a damp vegetable powder is packed in the conical cavity of a funnel and covered with paper to avoid the derangement of its strata, and water is poured carefully on, the liquid is absorbed, the insoluble cellular structure of the particles becomes swollen, and the whole mass, stratum after stratum, expanding laterally and vertically, finds no difficulty in relieving itself, owing to the inclination of its sides; but in a cylinder, the lateral expansion gaining no relief except vertically, the particles are compacted together, often to such a degree as to prevent the percolation altogether. I believe that, philosophically speaking, the cylinder is the proper shape of a percolator in cases where expansion presents no difficulty, but where this occurs, the use of a cone, as employed by Prof. Grahame, has very important advantages.

Whatever form of apparatus is used, or however the packing may be affected, the operator should either by a disc of paper, muslin, or lint, or a layer of sand, cover the surface of the ingredients so that the addition of fluid shall not disturb the stratification of the powders. Boullay employed an upper metallic diaphragm. If paper or muslin, &c., is used, it should be soaked in the liquid, and carefully pressed into its position, so as to remove the air beneath before adding the menstruum, else it will be displaced by its buoyancy.

But the peculiar merit of Prof. Grahame's paper is, that it insists on the invariable production of a highly concentrated solution at first (a result always attained most effectually by direct displacement,) which enables the operator to fraction his product, to make less menstruum suffice for exhaustion, and in cases requiring evaporation, shielding the principles from the injury of prolonged heating. He also can avail himself of it in making fluid extracts, by reserving the densest first liquid, evaporating only the weaker. This brings us to consider the subject of saturation in regard to pharmaceutical menstrua, and to explain how it is that a solution by direct displacement is necessarily more concentrated than one by displacement preceded by maceration, or by simple maceration. By way of illustration, let us take krameria: 1. The strongest aqueous solution attainable by maceration is that obtained by saturating rhatany powder with water, letting it stand in a cool place for twenty-four or forty-eight hours, and then expressing it. The largest proportion of material is thus brought in contact with the smallest proportion of solvent possible in this method, which we will assume to be a pound (7000 grs.) in a pint.

2. If now, instead of pressing this rhatany, it be placed in a percolator properly packed, and treated with water, so as to displace the infusion very slowly, the first fluid ounce that passes will nearly represent the liquid by maceration. The *second* fluid ounce will be stronger by the amount of matter dissolved in its passage through the powder occupied by the first fluid ounce. The *third* fluid ounce will be yet denser, owing to its gathering up from the leaving of the first and second fluid ounces. And this goes on until the added menstruum begins to mix with the last

portions, when the specific gravity of the mixture will be less than that of the infusion originally absorbed.

3. But when you operate by direct displacement (or in the way proposed by Prof. Grahame, which amounts to nearly the same thing, and is more certain), the first fluid ounce of liquid that enters the powder exerts its solvent power on *every successive layer of the powder*, until it ceases to dissolve any more, after which it is simply pushed downward by the gravity of the liquid above, minus the capillary attraction exerted (sponge-like) by the powder to retain it. The second fluid ounce proceeds in like manner to exert its solvent power till saturated and passed; and this process proceeds so long as the amount of soluble matter is sufficient to wholly satisfy the solvent action of the water during its contact, after which point the liquids will be found less and less dense. Now, on comparing the first portion of the liquid by direct displacement with the others, it will be found to be much stronger and more syrupy; and though the last portion of the pint will be weaker than any of the others, yet when all the proceeds of the immediate displacement are mixed, the average will be stronger than either of the others.

In conclusion, I will offer the following experiments :—

1. An ounce of gentian root was powdered and passed through a sieve sixty meshes to the inch, moistened with two fluid drachms of water, so as to be yet pulverulent. It was put in a funnel, the neck of which was previously stopped with *moistened* cotton, slightly pressed and covered with filtering paper, and the height in the funnel marked. Water was now poured on: the powder gradually absorbed its bulk, and a dark brown liquid collected in the vessel below. The densest liquid amounted to $3\frac{1}{2}$ fluid ounces, but more than eight fluid ounces were required to exhaust it. The first liquid, by standing a few hours, gelatinized, from the large amount of pectin it contained. The surface of the powder, when exhausted had risen half an inch in the funnel.

2. Two ounces of Alexandria senna, of similar fineness to the gentian, were moistened with half a fluid ounce of water, and arranged in a funnel as above. Water was poured on and was slowly absorbed, having required eight hours to become saturated; a dark, nearly black, syrupy liquid gradually collected below, requiring fourteen hours to four fluid ounces. This liquid was very highly charged with the properties of the senna and very odorous. The powder occupied twice its original bulk, and was gelatinous.

3. Two ounces of senna, moistened and put in a lamp-glass cylinder, refused the passage of the liquid after twenty-four hours, owing to its consistence.

4. Two ounces of rhubarb, of similar fineness, were moistened with half an ounce of water (a difficult operation, owing to the tendency of the powder to form a paste by contact with water, and thus oppose its general distribution among the particles), and treated precisely as the senna. The absorption took place with great slowness, about fourteen hours elapsing before the liquid commenced to pass, and twenty hours longer were required to fill an eight-ounce phial. Of the infusion, about one-half was saturated, and above this the liquid was less dense, but quite strongly impregnated with the colour and taste of the root. When we consider the comparative insolubility of the isolated resinous and colouring principles of rhubarb, it is surprising how large a quantity may be extracted by the slow action of cold water in this way. I believe that for treatment with cold water, rhubarb should be in powder of at least forty meshes, if not thirty, so that it will be more porous.

5. Two ounces of powdered calumba were treated in the same manner; the absorption was nearly as slow as in the rhubarb, about ten hours elapsing before it commenced to pass out below, and fourteen hours longer were required to fill an eight-ounce phial. On examining the product it was found that the first three ounces were dense and dark coloured, the liquid above being gradually less coloured, but quite bitter. The mass did not swell as much as the gentian. The result would indicate the impropriety of so fine a powder for calumba, because of the slow passage of the menstruum, and its tendency to decompose in warm weather before the root is exhausted, even with the use of the funnel.

All of these substances, with diluted alcohol, would have behaved much better, and the results have been obtained more quickly; yet the experiments serve to illustrate the influence of a conical percolator.

ON THE MANUFACTURE OF THE OTTO OF ROSE AT KISANLIK, IN EUROPEAN TURKEY.

BY J. LAWRENCE SMITH, M.D.,
Professor of Chemistry in the University of Louisville.

SEEING an article in the May number of the *Journal of Pharmacy* on the Otto of Rose, brought to my recollection some neglected notes made during my residence in Turkey,* on the culture of the rose and the extraction of its oil at Kisanlik, in the Balkan Mountains.

Having succeeded in finding those notes, and as they contain matter which may interest some of your readers, I forward them for publication.

The region where the rose is cultivated is a valley in the Balkan Mountains, in which is situated the city of Kisanlik, about sixty miles north west of Adrianople, in latitude 42° 40′. It is only within fourteen or fifteen years that the cultivation of the rose has taken its present development in that region, although for a number of years the otto has been made there in limited quantity, especially for royal presents. The surface of the country is that of an extensive plain, shut in by elevated ridges, and here the rose is cultivated by the farmers, who sell the roses to the distillers residing in Kisanlik, seldom or never distilling them on their farms.

The rose cultivated is of one kind, a full red rose, that was doubtless introduced into this region many years ago, and selected for its great fragrance and peculiar adaptation to the distillation of the oil. Its cultivation is attended with but little trouble. The bushes are allowed to grow from four to six feet high, although sometimes much higher.

The roses are gathered during the months of May and June, six weeks being the term usually occupied in getting in the crops.

The yield is on an average about 1½ lbs. of rose leaves to a bush, the roses being collected with the calyx.

They are gathered half expanded, and at the dawn of day, and not unfrequently before daylight. They cannot be kept advantageously more than a day before being put into the still; if obliged to do so, they must be turned over frequently, as otherwise they will ferment, heat, and the otto be lost.

The roses are placed in copper stills of about thirty gallons' capacity, in proportion of 60 lbs. of rose leaves to fifteen gallons of water, and the still immediately heated. The oil is in the first portion of the water which comes over; however, one half the water is distilled—this is collected in several large bottles. The water is now placed in a second still, and about one-fifth of it distilled, on which all the oil will float. The oil is taken off the surface with a little spoon and placed in an appropriate vessel. All the water distilled in both first and second operations is sent into market as rose water.

The water remaining in the still with the rose leaves is strained off and added to a fresh portion of leaves, in the proportion already mentioned.

The quantity of rose leaves required to produce one metical (1½ drachms) of the oil, varies from 30 to 60 lbs., according to the nature of the weather. If the roses open during wet weather, and flower slowly, the yield is at its maximum; if, however, the weather is hot, and the bush flowers vigorously, the yield diminishes, the rose itself is paler, and if not picked at an early stage yields almost nothing.

There is a green wax that comes off the calyx, attaching itself to the fingers of those collecting, that also yields an oil by distillation.

The annual product of otto of rose in this region is from 28,000 to 33,000 ounces, although so largely is it adulterated that the amount of oil exported as rose oil is upwards of 70,000 ounces.

The material employed for adulteration is the oil of a species of geranium, very probably the *Pelargonium roseum*, grown in Arabia, in the neighbourhood of Mecca,†

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* [NOTE.—Prof. Smith was engaged during two years in the geological survey of Turkey under the patronage of the Sultan.—EDITOR.]

† [NOTE.—The reader, by reference to page 336, will find this point satisfactorily settled by Mr. Hanbury, who shows that the so-called oil of geranium, though it does come to Turkey from Mecca, is really produced in Northern India, and carried to Mecca viâ Red Sea commerce.—EDITOR.]

and taken to Kisanlik, for the purpose of adulterating the otto of rose. This geranium oil has the odour of the rose mixed with that of the lemon.

In fact, it is a common thing, both in Europe and this country, to find this geranium oil in market, called otto of rose, sometimes mixed with a little spermaceti and benzoic acid.

On one occasion, a merchant at Constantinople told me that he sent large quantities of oil of geranium to parties in New York, who informed him through his agents in Smyrna, that it sold very readily in this country as otto of rose, and that the difference was not appreciated.

It is almost impossible to obtain the oil of rose pure ; the distiller hardly gets his oil together in the evening, before he commences to elongate it by a little geranium oil ; if it be only five per cent. he must put that in. Such small addition as that would be made only by *very conscientious traders*. Fifty to two hundred per cent. are far more commonly added. And should the otto happen to sojourn a little while at Constantinople, it would increase still farther in weight and bulk. In the bazaars of that city, three or four grades of the otto can be bought; of course, they are simply different degrees of adulteration.

The exact cost of manufacturing the pure otto of rose, at Kisanlik, may be estimated by referring to the following figures of an actual experiment made under my direction:—

10,000 lbs. fresh rose leaves	$140.00
Paid for use of still	6.25
Paid for labour and fuel	16.50
	162.75

Yield was thirty-six ounces, thus costing $4.52 per ounce to the producer.

This fragrant oil is made in other parts of the world by processes differing doubtlessly from the one described, also from a different rose; the one used in Tripoli is white, having but few petals. The rose grown in the southern portion of France bordering on Italy yields hardly a trace of oil by distillation, although only ½ degree further north than Kisanlik, the rose leaves there being used directly to impart their odour to perfuming soaps or distilled water.

As regards the manner of testing the purity of the oil, I agree with Mr. Mackay, that the sulphuric acid and other tests are of no value. The odour is the best test, and that can only be applied by experts where the otto is made.—*American Journal of Pharmacy*, p. 324.

PERMANENT PURPLE OR LILAC DYE.

Several correspondents having applied for information respecting the purple dye which is now so extensively used for giving to silks, &c., the different shades of purple or *mauve*, we give the following extract from the Specification of Mr. Perkin's patent, which describes the process for producing and applying the dye:—

"I take a cold solution of sulphate of aniline, or a cold solution of sulphate of toluidine, or a cold solution of sulphate xylidine, or a cold solution of sulphate of cumidine, or a mixture of any one of such solutions with any others or other of them, and as much of a cold solution of a soluble bichromate as contains base enough to convert the sulphuric acid in any of the above-mentioned solutions into a neutral sulphate. I then mix the solutions, and allow them to stand for ten or twelve hours, when the mixture will consist of a black powder and a solution of a neutral sulphate. I then throw this mixture upon a fine filter, and wash it with water till free from the neutral sulphate. I then dry the substance thus obtained at a temperature of 100° centigrade, or 212° Fahrenheit, and digest it repeatedly with coal-tar naphtha, until it is free from a brown substance which is extracted by the naphtha. Any other substance than coal-tar naphtha may be used in which the brown substance is soluble and the colouring matter is not soluble. I then free the residue from the naphtha by evaporation, and digest it with methylated spirit, or any other liquid in which the colouring matter is soluble, which dissolves out the

new colouring matter. I then separate the methylated spirit from the colouring matter by distillation, at a temperature of 100° centigrade, or 212° Fahrenheit.

"To produce the lilac or purple colour in the material to be dyed, I add a strong solution of the colouring matter (preferring an alcoholic solution) to a dilute boiling solution of tartaric acid or oxalic acid, and work the silk, cotton, or other material through it when cold.

"For dyeing wool it is found advantageous to boil the wool with the above solution and sulphate of iron, to rinse it in water, and afterwards wash it in soap and water."

The colours produced by the use of this new dyeing material are not only very delicate and beautiful, but they are permanent when exposed to light. The same colours when produced, as heretofore, from vegetable dyes, were extremely fugitive; so much so, indeed, that linendrapers rarely exposed fabrics of such colours in their windows.

PREPARATION OF OPIUM IN FRANCE.

M. Roux, Professor of Botany at the Naval School of Rochefort, has just sent in an interesting paper to the Academy of Sciences on the cultivation of the poppy in France for the purpose of extracting opium. His first researches on this subject date from 1851, but were more especially continued by him during 1856, 1857, and 1858, on eight different kinds of poppy. His results are stated as follows:—1. The Indian poppy furnishes a considerable quantity both of opium and seed; the cultivation of this vigorous species might be tried in those departments of France where the oil of the black garden poppy is a staple produce. The Indian poppy may be easily acclimatized in France. A quantity sown in October, 1857, has succeeded perfectly, and the young plants resisted a cold of 10 degrees centigrade (18 degrees below Fahrenheit's freezing point) in the following winter. This cold proved equally harmless to the white, black, and red species, which were sown about the same time. 2. The two latter produce the best opium, and their juice is much richer in morphine than is the case with the opiums of commerce. 3. A man can collect 100 grammes of opium in fifteen hours; and if women and children, who are so often in want of employment in the country districts, were employed on this task, the opium necessary for medical purposes might be entirely grown in France. 4. The growing of opium might become very profitable in France, where poppy-oil is manufactured to the amount of from 25,000,000f. to 30,000,000f., and where it would, consequently, be easy to add a new branch to that trade by the extraction of opium; and it might even, in course of time, become an article of exportation. Home-grown opium has been tried, at M. Roux's request, by M. Duval, first chief Navy Surgeon at Brest, and found to answer very well, owing to the quantity of morphine it contains.

ON THE THERAPEUTIC PROPERTIES OF SARSAPARILLA.

BY PROF. BÖCKER, OF BONN.

Dr. A. M. Adam, in some interesting *Medical Notes from the Continent*, refers to some experiments by Prof. Böcker upon sarsaparilla, as yet unpublished. Dr. Böcker told Dr. Adam, "that after carefully performing ninety-eight experiments with this drug on healthy people, he found that, contrary to all our usually received opinions on the subject, it possesses neither diuretic nor diaphoretic properties. Another series of twenty-six experiments, on the persons of uncured syphilitic patients, gave exactly the same results. Böcker also satisfied himself that sarza does not increase the efficacy of the agents, such as iod. potass., &c., which are usually given along with it; and that the good results obtained by the administration of this salt, dissolved in decoction of sarza, are in no degree attributable to any virtue in the solvent fluid. I told Dr. Böcker that I remembered hearing Professor Syme, many years ago, express his opinion on the utter useless-

ness of so expensive a drug as sarza, remarking, in his own quaint, forcible style, that he believed an 'infusion of hay' would be just as good, and a vast deal cheaper. He seemed amused, and said that he entirely agreed with Syme; that infusion of sarza had no greater effect on the system than so much common tea; and that we must regard it merely as a pleasant, but very expensive, vehicle for the administration of other medicines."—*Edinburgh Medical Journal.*

ON THE MEDICAL ADMINISTRATION OF OZONIZED OILS.

BY DR. THEOPHILUS THOMPSON.

In a paper read before the Royal Medical and Chirurgical Society, on Tuesday the 28th of June, the author, after some general remarks on the properties of ozone, describes the results obtained from its administration in association with oils; the oils being ozonized by exposure for a considerable time to the direct rays of the sun, after previous saturation with oxygen gas, according to the process adopted by Mr. Dugald Campbell. The cases of fourteen consumptive patients to whom the ozonized oils were given are detailed; and the principal facts noted are also appended in a tabular form. The conclusion to which these experiments point is, that the administration of ozonized oils has a remarkable tendency to reduce the frequency of the pulse. Of the fourteen patients whose cases are detailed in this communication, there are only two in whom no such effect was observed; and although in a few instances the effect may have seemed insignificant or transient, in a larger proportion it was very considerable, and must be attributed to the ozone rather than to the oil, since it was repeatedly manifested in patients who had taken cod-liver and other oils without any reduction, or even with an acceleration, of the pulse; and further, the effect on the pulse was nearly as distinct when the ozone was associated with the oil of the cocoa-nut, or of the sunflower, as with that of the cod-liver. This circumstance is the more significant, since the administration of sunflower oil without ozone has not appeared to the author to manifest any important remedial power. The reduction of pulse was usually observed in two or three days, and often continued progressive. A reduction of twenty beats was observed in certain cases to occur respectively in two, three, four, and six days; in other instances a reduction was noted of twenty-four pulsations in fourteen days, thirty-four in thirteen, thirty-six in twenty-two, forty in eleven. In one patient the pulse fell as low as 60—probably considerably below the natural standard; but in most of the favourable instances the reduction stopped when that standard was obtained. The apparent effect of the remedy is one which, prior to experiment, the author would not have anticipated. No other obvious result was noticed, excepting a general improvement in the patient's condition. In some of the patients the use of simple and of ozonized oils was alternated. In one case the alternation was made three times, and the result was, in each interchange of treatment, so direct and remarkable as to make that particular example equivalent in force to three experiments. In addition to the patients under his own observation, the author refers to four instances noted by Dr. Scott Alison, who obligingly pursued the investigation during Dr. Thompson's absence from the Hospital. In these four cases the disease was in the third stage. In two, a remarkable reduction in the rapidity of the pulse, amounting to about twenty beats, occurred under the use of the ozonized oil, while the improvement induced could not be referred to any other cause. Dr. Alison remarks, "I attach some value to this observation; for I prescribed the oil totally divested of all prejudice in its favour, and I have always been reluctant on imperfect grounds to refer results to the operation of medicines. If ozonized oil can reduce the rapidity of the circulation—a feature of great prominence in phthisis,—this remedy possesses a most valuable property, rendered still more valuable by its contributing at the same time to improve the general health." The author mentions having used ozonized oil of turpentine with marked and prompt advantage in some cases of hæmoptysis, but has not sufficiently repeated the experiment to feel entitled to express an opinion as to its remedial superiority over ordinary turpentine. He adds that, should more extended observation establish for ozonized oil the property indicated by these

experiments, it will prove a valuable addition to our list of remedies, especially in consumption (which is a disease peculiarly characterized by hurried action); but not, perhaps, exclusively in this disorder, since there are other morbid conditions in the treatment of which it is very important to lower the pulse without reducing constitutional strength.

EXPERIMENTS ON THE PHENOMENA OF RESPIRATION.

BY DR. EDWARD SMITH,

Assistant-Physician to the Hospital for Consumption at Brompton.

In this paper the author describes the quantity of carbonic acid expired, and of air inspired, with the rate of respiration and pulsation in reference to the whole day and night, the variations of the day with and without food, and the variations from day to day, and from season to season. The total quantity of carbonic acid expired in the twenty-four hours was determined in four gentlemen in eight experiments, some of which were continued for eighteen hours, with short intervals for meals only ; and others were made at the beginning of each hour and half-hour during that period. The quantity of carbonic acid exhaled in the six hours of the night is 1950 grains, and the total amount of carbon exhaled in the twenty-four hours at rest varied from 5.16 to 7.144 ounces in the different persons. The effect of walking at two and three miles per hour is found to be equal to $1\frac{4}{5}$ and $2\frac{3}{5}$ times that during rest ; and by making a computation of the amount of exertion made by different classes of the community, the author finds that in the non-laborious class the carbon was increased from 7.144 ounces when at rest, to 8.68 ounces, and in the laborious class to 12.19 ounces daily. During profound sleep the amount of carbonic acid is lessened to the extent of half of that of the average of the day. The variations of the day with food are so great that the maximum is one-half more than the minimum, and in one gentleman it was nearly double the minimum, the greatest occurring after each meal, but particularly after breakfast and tea, and the least immediately before the meals. During a fast of twenty-seven hours the minimum quantity was maintained almost without change during the whole period of wakefulness, but there was a rise at the periods when the quantity usually rose with food. The quantity of carbon evolved in twenty-four hours without food is 5.923 ounces instead of 7.144 ounces with food—a quantity equal to that contained in 20 ounces of bread. The blood and the secretions become unusually alkaline. The variations from day to day were due to temperature and the state of the system. Sudden increase of temperature caused a sudden decrease in the respiratory changes, which continued until the temperature rose. This was an ever-acting cause of variation, but was the greatest after the cold of the winter. The state of the system caused by changes in the proportion of waste and supply, varies the quantity of carbonic acid evolved on the following morning. A good night's rest, a feeling of health, good supply of food, and not too much exertion, give an increase on the following morning (hence there was usually a high state of system on the Monday), and the reverse under the contrary conditions. As these conditions vary from day to day, the amount of carbonic acid evolved varies every day. The variations which are due to season are very remarkable and important, since it was shown that the respiratory changes vary from season to season in a definite and periodic manner, and so that the greatest changes occurred in the cold season, and the least in the hot season, and with definite periods at which this variation begins.

Dr. Smith also shows the amount of carbonic acid evolved with the exertion of the treadwheel.—*Proceedings of the Royal Society.*

EXPERIMENTS ON THE ACTION OF FOOD UPON THE RESPIRATION.

BY DR. EDWARD SMITH.

The method adopted by the author in these researches is—1st. To take the food under examination apart from the influence of other food, and, therefore, before any meal had been taken. 2nd. To take about the quantity usually taken by mankind.

3rd. To ascertain the amount of carbonic acid expired and of air inspired, with the rate of respiration and pulsation in a state of perfect rest, and in the sitting posture immediately before the food for examination was taken, and to compare all results obtained during the action of the food with this basis quantity. 4th. To make an inquiry in from three to ten minutes after taking the food, and to repeat it every twelve or fifteen minutes, until the maximum influence was obtained; the conditions as to posture and quietude remaining unbroken. It is found, from the hourly variations of these phenomena of respiration, that such an inquiry could not be made correctly between the meals, on account of the incessant variations then occurring from the meals (a source of error in the results obtained by Böker and other observers); nor in the evening, since at that period all the phenomena declined; and that only in the morning before breakfast, and before the usual breakfast hour, could trustworthy results be obtained. It is found, also, that the influence of food is evident soon after its introduction into the system, and attains its maximum within about two hours. The persons experimented upon were chiefly the author himself and Mr. Moul; but Dr. Frankland, Mr. Hoffman of Margate, and Mr. Reid of Canterbury, had also submitted themselves to the inquiry. The substances investigated were very numerous, and the experiments exceeded two thousand. The following is a list of the foods described in this communication: 1. Starch series—arrowroot, arrowroot and butter, arrowroot and sugar, commercial starch, wheat starch, gluten, bread, oatmeal, rice, rice and butter, potatoes and gum. 2. Fats—butter, olive oil, cod-liver oil. 3. Sugars—cane sugar, grape and milk sugars, cane sugar with acids and alkalies. 4. The milk series (cow's)—new milk, skimmed milk, casein, casein and lactic acid, lactic acid, cream, sugar of milk and lactic acid. 5. Alcohols—spirits of wine, brandy, whisky, gin, rum, sherry and port wine, stout, ale. 6. The tea series—tea, green and black; hot and cold, in different quantities, and with acids and alkalies; coffee; coffee leaves; chicory and cocoa. 7. Other nitrogenous substances—gelatin, albumen, fibrin, almond emulsion. It is impossible to give an abstract of all the results obtained, although the author in this communication, limits himself entirely to a statement of facts, leaving all theories and practical application of the facts for another occasion; but the following are a few of the principal results: 1. Pure starch and fats do not increase the quantity of carbonic acid evolved; but, on the contrary, the latter somewhat lessen it. 2. These substances are either not found alone in nature, or they are not used alone as food, but are associated with other substances, which tend to call them into action, and which constitute a class which the author has termed "respiratory excitants." 3. The cereals—viz. wheat-flour, oatmeal, and rice, containing besides starch, albuminous products, gluten and sugar, have a great and enduring power in increasing the production of carbonic acid—an increase equal to, or exceeding, two grains per minute, and continuing upwards of two hours. 4. Milk, in its natural combination and in each of its elements, excites the respiration to an extent, from new milk, of nearly two grains of carbonic acid per minute. Lactic acid had the least influence, and then cream; but cream had more influence than butter. No artificial combination of the elements of milk produced the effect of the natural milk. Milk produces its effects in different degrees in those who like and who do not like it. 5. Sugars are most rapid and powerful respiratory excitants, so that $1\frac{1}{2}$ oz. of cane sugar gave an increase of about two grains of carbonic acid per minute, in less than half an hour. The addition of acid usually increased the maximum, while that of alkalies increased the duration of its influence. Milk sugar had less influence than cane sugar, and grape sugar less than either; but the latter still produced an increase of more than one grain of carbonic acid per minute. Thus. of the hydrocarbons, sugar must be classed apart from starch and fat. 6. Tea and coffee are powerful respiratory excitants, producing an increase of from $1\frac{1}{2}$ to 3 grains of carbonic acid per minute, and an effect which endured upwards of one hour. Acid, added to tea, made it more stimulating; and alkalies rendered it more soothing; but a fixed alkali destroyed its influence. Chicory and cocoa have a similar but less powerful action; while coffee-leaves caused a diminution in the exhalation of carbonic acid of one grain per minute. 7. Alcohols differ in effect both in the different members of the class, and in different specimens of the same kind. Alcohol always increased the evolution of carbonic acid to the extent of less than one grain per minute. Rum,

also, commonly had the same result, and good malt liquors produced an increase sometimes exceeding one grain per minute, and enduring more than two hours. Sherry wine commonly gave a small and sustained increase. Brandy and gin, and particularly the latter, lessened the quantity of carbonic acid evolved, while whisky varied with the different specimens. The inhalation of the volatile elements of alcohol, and spirits and wine, caused a diminution in the quantity of carbonic acid, and an increase in the vapour exhaled by the lungs. These various members of this heterogeneous class differ greatly in the amount of alcohol which they contain, as well as in their other elements, as sugar, gluten, acids, salts, and volatile oils, and ethers, and, in the author's opinion, should not be classed together. 8. Gelatin, albumen, and fibrin also increase the production of carbonic acid to a maximum quantity less than one grain per minute. 9. Thus nearly all nitrogenous foods are "respiratory excitants." 10. Foods may be thus classed in reference to this latter quality: Non excitants — starch, fat, some alcohols, coffee-leaves. Excitants — sugar, milk, cereals, potato, gluten, casein, gelatin, fibrin, albumen, tea, coffee, cocoa, chicory, alcohol, rum, ales, and some wines. As above stated, the author does not discuss the mode in which they produce these effects, but he adduces several facts which may aid in forming an opinion upon the subject. The author also states that wherever there was an increase in the quantity of carbonic acid evolved, there was also an increase in the quantity of air inspired; but that these were not due to increased rate, but to increased depth of respiration. He also finds that the same food produced effects differing in degree in different persons, and in the same person at different periods, and that such was also the case with the action of acids and alkalies upon the human system.—*Proceedings of the Royal Society.*

GAS LIGHTED BY ELECTRICITY.

Two "sun-lights," each containing 75 burners, have been placed immediately under the ceiling in the centre of the music hall in the Edinburgh University, the ceiling being 40 feet in width and 50 feet from the floor. These burners have been successfully lit by an application of the electric current. The mode of operation may be thus explained:—The galvanic battery is placed in the cellar, and from it positive and negative wires are carried up the side of the hall and along the ceiling to immediately over the burners. Then it is coiled round the poles of an electro-magnet, to the keeper of which are attached a couple of wires bearing a platina wire. On the current of electricity being established at the battery, the platina wire, placed within an inch of the burner, becomes red-hot, and the gas being simultaneously turned on, the whole 75 lights, which are closely contiguous, immediately flash into flame. The electric current having thus answered its purpose, is at once intercepted at the battery below, and the electro-magnet, ceasing to be a magnet, its keeper, with the wires attached, falls three inches below the flame, so drawing down the platina wire, which, were it to remain in position, would be destroyed by constant exposure to the powerful flame of the gas.—*Manchester Guardian.*

AMMONIA FROM THE WASTE GASES OF THE VITRIOL CHAMBER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In your number for this month I observe Mr. Williams of Neath claims originality for his process of making ammonia from the waste gases of the vitriol chamber. In May, 1856, I took out letters patent, in which I claim "The passing the waste gases from the sulphuric acid chamber, mixed with steam, over heated spongy platinum, or other substances, to form ammonia, as described." Mr. Williams's process is a direct infringement of this patent. Your publication of this will oblige,

Your obedient Servant,

Geo. F. Tanner.

CASE OF SUSPECTED POISONING BY CANTHARIDES.

On Monday, June 28th, Mr. John Humphreys, the coroner for East Middlesex, held an inquest, which had been adjourned for the third time, at the Waterloo Hero Tavern, Poplar, respecting the death of Ziporah Royal, aged 21 years, who died from the effects of some irritant poison supposed to be cantharides. It was stated in evidence that the deceased and her husband had been lodging for about eight months in the house of a Mrs. Allen, 44, Gough Street, Poplar New Town. On the 31st of May, the deceased (who had only been confined five weeks) was seized with violent pains. The landlady was called, when brandy was administered, but the symptoms increased, and Mr. Webb, Surgeon, was sent for, who found deceased suffering from intense thirst, and a burning sensation in the throat ; she continued to get worse, and died on Saturday, June 4th. In reply to a question from the landlady, deceased said she had only taken some coffee which her husband had made her drink, although it was very bitter.

Sarah Ann Eagle stated, that she knew the deceased, who was not married to Royal, her correct name was Ziporah Wright, and she had formerly lived with witness as servant. The man Royal was brother to witness ; he had left the house the day previous to the death, and had not returned.

The *post mortem* examination was made by Mr. Webb, and the analysis by Dr. Letheby, who said that he had used various tests, but could not find any solid poisons. There were no traces of arsenic or other mineral poison, but on further examination of the parts, he detected a powerful acrid irritant in the intestinal canal, of an organic nature, which would account for the symptoms described. He could not precisely identify it, but it was more like cantharides than anything else, and was most probably administered in a soluble form. He had tried a portion of the liquid found in the stomach upon his lip, and it raised a blister immediately. The coroner having read over the whole of the evidence, the jury unanimously agreed to a verdict of "Wilful murder against George Frederick Royal," and a warrant for his apprehension was issued.

SUICIDE BY LAUDANUM.

On Friday, July 15, an adjourned inquest was held by Mr. C. J. Carttar, coroner for West Kent, at Charlton, on the body of William Enoch Durand Cumming, who died from taking a large dose of laudanum. It appeared from the evidence, that deceased had formerly been an underwriter at Lloyds, and carried on business as a broker. A few years since he retired with a considerable fortune, but had recently been connected with the Derrick Company for raising sunken vessels, and other speculations, and it was proved that these losses had preyed upon his mind. The bottle which had contained the laudanum was found with a glass in a field where the deceased was walking a few hours before his death. After some remarks from the coroner, the jury returned a verdict that the deceased committed suicide by taking laudanum whilst labouring under temporary insanity.

DEATH FROM THE STING OF HORNETS.

In a letter by an Indian gentleman, living near Jubbulpore, it is stated that two European gentlemen belonging to the Indian Railway Company—viz., Messrs. Armstrong and Boddington—were surveying a place called Bunder Coode, for the purpose of throwing a bridge across the Nerbudda, the channel of which, being in this place from 10 to 50 yards wide, is fathomless, having white marble rocks rising perpendicularly on either side from 100 to 150 feet high, and beetling fearfully in some parts. Suspended in the recesses of these marble rocks are numerous large hornets' nests, the inmates of which are ready to descend upon any who may venture to disturb their repose. As the boats of these European surveyors were passing up the river, a cloud of these insects overwhelmed them ; the boatmen as

well as the two gentlemen jumped overboard, but Mr. Boddington, who swam, and had succeeded in clinging to a marble block, was again attacked, and being unable any longer to resist the assaults of the countless hordes of his infuriated winged foes, threw himself into the depths of the water never to rise again. On the fourth day his corpse was discovered floating on the water, and was interred with every mark of respect. The other gentleman, Mr. Armstrong, and his boatmen, although very severely stung, are out of danger.

THE SUSPECTED CASE OF POISONING AT RICHMOND.

CENTRAL CRIMINAL COURT.

Before the Lord Chief Baron.

On Thursday, July 7, Dr. Thomas Smethurst was placed at the bar, charged in the indictment with the wilful murder of Miss Isabella Bankes, by slowly poisoning her with arsenic. Mr. Serjeant Ballantyne appeared for the prosecution, and Mr. Serjeant Parry for the defence.

The particulars of the case, as given before the magistrates, have already appeared in our number for June. The trial was resumed on Friday, when, in consequence of the illness of one of the jurors, it was postponed till the next session of the Central Criminal Court.

BOOKS RECEIVED.

A Dictionary of Trade Products, Commercial, Manufacturing, and Technical Terms; *with a Definition of the Moneys, Weights, and Measures of all Countries reduced to the British Standard.* By P. L. Simmonds, F.R.G.S., F.S.S., &c. London: Routledge. 1858. Small 8vo., pp. 422.

This little work is, as its title-page states, *a Dictionary*, and, as such, it is arranged in alphabetical order, the popular names standing first. The *Trade Products*, considering the difficulties arising from their number and variety, are mostly defined with tolerable brevity and correctness. Still there are many cases in which one could suggest an improved definition, and some few in which it is absolutely erroneous. As an exemplification of our remark, let us observe that the definition of White Pepper as "made by blanching the black pepper," would have had more meaning and greater accuracy had it stated that the "blanching" was occasioned *by the removal of the outer coat or pericarp.* Again, *Kino*, as occurring in commerce, is essentially the produce of the Indian *Pterocarpus Marsupium*, and there is no need to describe it so vaguely as "obtained from various Australian and Indian trees." "*Pillococia*" should not be defined as a "drug for pills;" it would be more correct to say, *a corruption of* Pilulæ cocciæ, *the ancient name of a certain purgative pill.* As erroneous definitions, we may notice Sumbul Root, referred to *Valeriana Jatamansi*, Lycopodium confounded with Puff-ball, and St. Ignatius beans with Nux Vomica.

Nor is our author by any means strong in the chemical department. Blue-stone is defined to be "a common name for sulphate of copper and vitriol." Hydrocyanic acid is declared to be a name for Prussic acid, and Prussic acid we find described as a name for Hydrocyanic acid. Bath-stone is a "volatile limestone." Nothing, however, is more startling than the definition of Oxygen, which is simply stated to be "a manufacturing name for bleaching powder." But this extreme brevity is not, we must say, a prevailing fault,—witness,

> "Jack, a name for a male ass; a sailor; an instrument for pulling off boots; a powerful machine for raising great weights, its ordinary power being about five tons; a kitchen machine for turning a spit, the moving power being either a weight, or the smoke and rarified air of a chimney; a wooden frame for sawing timber on; a wedge; a flag carried on the bowsprit of a vessel; in the Orkneys, a term for taking off the skin of a seal."

In many cases the author has introduced a great number of compound words which, to our thinking, have no claim to a place in such a work. The word *Oyster* may be admitted, as giving the opportunity for stating that London consumes of this mollusc to the extent of 300,000 bushels annually. Perhaps *Oyster-bed* and *Oyster-dredge* have some pretensions to the rank of technical terms; but what is the use of defining separately compound words so familiar and intelligible as *Oyster-knife*, *Oyster-opener*, *Oyster-patty*, *Oyster-room*, *Oyster-sauce*, and *Oysters scalloped?*

Rice Pudding, Road and Dust Contractor, Road Surveyor, Ruling Machine, Shop-counter, Shop-fittings, Shop-front, Soup-kitchen, Soup-ladle, Soup-plate, Soup-pot, Soup-ticket, Soup-tureen and a host of familiar words of the same character, have, we think, no proper place in a *Dictionary of Trade Products.*

We hope the author will receive our criticisms in good part, and that the demand for a second edition may enable him to act upon some of the suggestions we have thought right to make.

TO CORRESPONDENTS.

B. B. (West Bromwich).—(1.) Iodide of Quinine is very sparingly soluble in water, but is soluble in glycerine and syrup in the proportion of about one grain to the drachm. (2.) It would be impossible to account for the variation in colour of different specimens of ammonio-citrate of iron without an examination.

G. H. (Islington).—(1.) *Granular Citrate of Magnesia.* The article sold under this name is not strictly a citrate of magnesia, but a sodio-citrate. The manner of preparing it is at present kept secret. (2.) *Tincture of Myrrh and Borax.* Vol. 8, p. 96.

P. S. M. (Berwick).—*Liquor Sodæ Chlorinatæ.* The formula will be found in the London Pharmacopœia.

An Original Member (Glo'ster).—It would be necessary to know all the circumstances of the case before answering the question, and even then it would be more suited for a solicitor than for us.

S. E.—Yes; a penalty has recently been awarded under the Medical Registration Act.

M. P. S. (Southampton).—On the addition of nitric acid to sulpho-cyanide of potassium, the change alluded to does take place.

A London Member.—The information required will be found in the last Census. It would, however, be liable to mislead, as many, not strictly belonging to the class, are included in the return.

An Old Member.—The medicines would be liable to stamp duty, whether the labels were attached to the bottles or not.

ERRATA.

Page	53.	Greenwell, Baker, *prefix* No. of Certificate, 65.
"	61.	Bowman, William—*prefix* No. of Certificate, 29.
"	82.	Scholefield, George, *read* Liverpool *for* Birkenhead.
"	85.	Teasdale, Thomas, Darlington, *prefix* No. of Certificate, 7.
"	93.	*For* Briggs, John Aston, *read* Briggs, James Aston.
"	94.	*For* Steward, James, *read* Stewart, James.

MEMBER OMITTED.

1859	325	..... Kendall, Charles Fisher	Clapham Road.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. III.—SEPTEMBER 1st, 1859.

SKETCH OF THE LIFE OF JACOB BELL,

LATE PRESIDENT OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

In the history of Pharmacy in Great Britain the name of Jacob Bell will always occupy a conspicuous and honourable position. With the earliest efforts to found a Pharmaceutical Society in this country, and their ultimate success, with the difficulties that the new Society encountered by the defection of many of its early supporters, with the dangers that arose from internal dissensions and from legislative interference, his name will always be intimately associated.

The removal by death of one to whom more than to any other the Pharmaceutists of this country stand indebted, and by whom in a pre-eminent degree the progress of Pharmacy in Great Britain has been advanced, is an epoch in the history of the Pharmaceutical Society; and the desire will naturally arise in the minds of its Members to become acquainted with some of the incidents in the life of one who has been so closely connected with it from its formation to the present time.

Jacob Bell was the eldest surviving son of John Bell, and was born in Oxford Street, in the parish of St James, Westminster, on the 5th March, 1810.

The elder Mr. Bell, who was a man of the utmost integrity and benevolence, was a Member of the Society of Friends, and most conscientiously desirous of bringing up his children in conformity with the views held by that section of the Christian Church. In the year 1798 he commenced business in Oxford Street, and by his diligent application and unswerving uprightness, laid the foundation of the important pharmaceutical establishment with which his name is still associated. After his death, which took place in the year 1849, a short but most instructive sketch of his early career, from the pen of his son, appeared in the pages of this Journal.*

When between twelve and thirteen years of age, Jacob Bell was sent to the school of his uncle, Mr. Frederick Smith, at Darlington, where he remained for about four years. The establishment of this gentleman had deservedly a high reputation in the Society of Friends, and under the tuition which he there received, aided by his own diligent application, he soon made rapid progress.

Most boys have a horror of *themes*, but this was not his case,—in fact, composition, whether in prose or verse, was his *fort*, even in school-days. Among several early literary productions still preserved, is an Essay on War, which was written for and gained a prize. This Essay, which was composed at the age of sixteen, and extends over 140 pages, is far beyond the average of schoolboy productions, and it is remarkable that the views which the young author upholds in it condemnatory of war, were strongly retained by him through life. An Essay on Slavery, of above 100 pages, written about the same time, is of considerable merit, and further attests his diligence and his aptness at writing. Another piece of authorship, undertaken in conjunction with his schoolfellow, Lawson Ford, was a MS. periodical, under the whimsical but characteristic title of *Bellford* [Bell-Ford] *Gazette*. It was devoted to school news and chit-chat, and was carried on with much humour for some months.

Upon leaving school, Jacob Bell was apprenticed to his father's firm, and came to reside at the house of business in Oxford Street. Here his position was like that of the other apprentices and assistants, and he had to take duty

* Vol. viii., p. 589.

with them, even to the Sunday serving and attendance in the shop after the usual hours of business.

But although the pursuit of business was thus insisted upon, he was not idle in the matter of self-improvement. At the Lectures on Chemistry at the Royal Institution, and on the Practice of Physic at King's College, he proved himself a diligent student. At a later period he worked at practical chemistry in the house of business in Oxford Street, converting his bedroom into a laboratory, and fitting it with a furnace and other apparatus.

About this time he also amused himself in leisure hours by the study of comparative anatomy, and especially by the preparation of skeletons of animals, in which, being a nice manipulator, he was very successful. These specimens were mostly prepared on his father's premises at Wandsworth, where bitter denunciations sometimes arose when the odious effluvium of some dead monkey, rat, or porcupine, undergoing its term of maceration, penetrated unbidden the quarters of the family.

But his predilection for animals extended to the living also, and the Zoological Society was therefore an object of much interest with him. It was, however, in horses and dogs that he specially delighted. He was himself an admirable horseman, and as his father's country house was some few miles out of town, he could indulge in the pleasures of riding without interfering with business. At one time hunting was a favourite pursuit, but the urgent entreaties of his father, who highly disapproved of such an amusement, induced him to relinquish it. The gaieties of London life had, however, strong attractions, and, as with everything else that he undertook, he entered into them with great spirit.

At school, drawing had been a favourite pursuit, and in order to continue it when settled in London, Mr. Bell used to attend the morning class at Sass's Drawing School, and he also received lessons in oil painting from his friend, Mr. H. P. Briggs, R.A. His taste in this direction was natural; and had he been able to pursue painting as a profession, success would in all probability have attended his efforts. As it was, he saw he could attain only mediocrity. The progress of his fellow-students, who could count their days of study while he could reckon only upon hours, discouraged him, and ultimately caused him to abandon the practice of art. In humorous sketching, however, he was very clever, and many a page of a journal kept in his early days at Oxford Street, contains illustrations that would do credit to *Punch*. In fact, his keen sense of the ridiculous was innate, and, coupled with an originality of expression, it characterized what he wrote from childhood upwards.

But although drawing was no longer pursued by Mr. Bell as a study, his associations with art were not discarded. Though he could not aspire to be an artist, he looked with admiration upon those whom he felt were more favoured than himself. With such tastes he naturally soon formed the nucleus of a collection, which in after years, when in the possession of more ample means, he enriched by the acquisition of some of the finest productions of the modern school. Of the celebrated works in his collection we may enumerate the Sleeping Bloodhound, the Shoeing, Alexander and Diogenes, Dignity and Impudence, the Defeat of Comus, the Maid and the Magpie, by Sir Edwin Landseer; the Horse Fair, by Rosa Bonheur; the Derby Day, by Frith; James II. receiving the News of the Landing of the Prince of Orange, by Ward; and some delightful cattle pieces, by Lee and Cooper. These, together with some other paintings, in all about twenty, were found, after Mr. Bell's death, to have been bequeathed by him to the national collection. The value of the legacy has been stated, we believe with correctness, at from £18,000 to £20,000.

But it would be wrong to suppose that it was only as a liberal purchaser that Mr. Bell showed his sympathy for art. His service was perhaps equally important in another way, and that was in placing artists in their proper position with regard to copyright. Regarding the subject from a business point of view,

he perceived the full value of the privilege; and, by the advice and assistance which he gave, he enabled artists to claim advantages which they had previously but very partially appreciated.

In the year 1840, Mr. Bell accompanied his friend Mr. (now Sir) Edwin Landseer, then in poor health, upon a journey on the Continent. Belgium, the Rhine, and Switzerland, were visited; but arrived at Geneva, Mr. Bell was taken ill, and the travellers had to change their respective positions of patient and nurse. The malady was a severe attack of quinsy, producing symptoms very similar to those from which he suffered many years afterwards, when labouring under an affection of the larynx,* and it proved so serious that he and Mr. Landseer were detained in Geneva six weeks. Under the care of Dr. Coindet, Mr. Bell's health was so far restored, that he was able with his companion to cross the Jura in the snows of December, and, reaching Paris, to witness the solemnities that celebrated the arrival in that city of the remains of the first Napoleon. From Paris they returned to London, arriving there on the 31st December, after an absence of about four months.

On the 15th February, 1841, a public meeting was held in London in order to organize an opposition to a bill introduced into Parliament by Mr. Hawes, for the purpose of *Amending the Laws relating to the Medical Profession in Great Britain and Ireland,* inasmuch as the bill in question contained clauses vitally affecting the interests of Chemists and Druggists. At this meeting a committee was appointed, of which Mr. Bell was a member, and the opposition was carried on so vigorously that the proposed measure was abandoned. It became evident, however, to many of those who took part in these proceedings, that the *esprit de corps* which had been raised in the hour of danger might be taken advantage of for the formation of a permanent society, and that such a society might interpose a most effectual safeguard for the protection of the interests of the trade, as well as for gradually raising it to the *status* which it occupied in other countries.

The result was that at another public meeting held on the 15th April, the formation of the Pharmaceutical Society of Great Britain was decided upon.

Although this step may be said to have laid the foundation of the Society, yet, as is well known to all those who have had experience in such matters, a vast amount of hard work had to be accomplished before the Society could be reduced to anything like working order. Rules had to be framed, officers appointed, and even the members, most of them but slightly known to each other, or perhaps almost antagonistic, had to be coaxed into cordial co-operation.

Here the tact and energy of Jacob Bell, who had throughout been warmly

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* In a most amusing account which Mr. Bell has left of this journey, he has described in his own peculiar facetious way the sufferings he experienced during this attack; and they accord so precisely with those which occurred in his last illness, that we have obtained permission to quote the passage.

* * * * * * *

(*Enter the Servant to lay the Cloth for dinner.*)

B. "What an unfortunate victim I am! I am doomed to endure Benjamin's appetite and Sancho Panza's mortification!"

L. "What do you mean by Benjamin's appetite?"

B. "We are told that when Joseph in Egypt fed his eleven brethren with bread and milk, Benjamin's mess was five times as large as any of the others, and as we are not informed that he left any of it, we may conclude that his appetite was in the same ratio. Those who have seen Leslie's little picture of Sancho Panza at the conclusion of his untasted repast, can imagine what he felt by the expression of his countenance. *I* can imagine it by feeling the same torture myself, and a few inflammatory twitches into the bargain."

L. "Here comes the soup! Try and swallow a little bread sopped in it."

B. "I'll make the attempt.———Every mouthful of soup is like a dagger: a little runs heavily down, and the rest becomes glutinous, and stops the passage until I spit it out. I can take no more; though I would gladly devour those cutlets, the fowl, and crusty bread in proportion. In fact, I am inclined to be angry with the *garçon* when he takes away the bread which I have not dared to attack; as an old sportsman would fain keep his guns, whips, and dogs in his sight, although his sinews have become stiff and powerless, and his activity has fled for ever."

interested in the proceedings, became of signal service. In order to keep alive and extend the interest which had been excited, and to promote friendly intercourse among the members of the trade, and those who were disposed to favour the formation of a Pharmaceutical Society, several evening meetings of a social, rather than formal character, were held by invitation at his house in Oxford Street. On these occasions the constitution of the new Society was discussed, explanations were given, objections replied to, and a general opportunity was afforded for the interchange of sentiments on various subjects of interest to the Pharmaceutical body. To convey to those, who from distance or other causes were unable to attend these meetings, some information of what was taking place, and also to afford a general answer to the numerous inquiries daily received, Mr. Bell published a pamphlet entitled *Observations addressed to the Chemists and Druggists of Great Britain on the Pharmaceutical Society*, which was largely circulated.

These zealous efforts were attended with success, and the new Society increased rapidly both in numbers and importance. It is, however, unnecessary to trace the whole history of the Pharmaceutical Society in order to show how large an amount of its prosperity is due to the labours of Mr. Bell. Let us recollect that he was a Member of the Council from the commencement of the Society to the day of his death, and that hardly any engagement was ever allowed to interfere with his attendance of its meetings. As a Member of Committees, and of the Board of Examiners, and as an attender of the evening Meetings, his diligence was equally unfailing.

The formation and healthy active existence of Provincial Branches of the Pharmaceutical Society was also an object of much solicitude with Mr. Bell; and many a rapid journey did he take when he thought that his presence and advocacy might assist in promoting the objects in view. The kindly and disinterested feeling, and conciliatory spirit he displayed on these occasions, will long be remembered.

Many little examples of his disinterestedness, which was often exhibited in an eccentric way, might be mentioned. One, very characteristic of himself, occurred in reference to the copy of Nees von Esenbeck's *Plantæ Medicinales*, which is in the library of the Pharmaceutical Society. The fly-leaf of this valuable work has in it the following memorandum, in Mr. Bell's hand:—

"A member of the Council having an offer of this book at about half price, proposed it to the Council, and it was resolved unanimously that it was desirable to secure it for the Pharmaceutical Society. It was, therefore, referred to the Library Committee; but in the mean time it was necessary to give an answer, which the member above mentioned did, taking the book and waiting the final decision of the Committee.

"When the Committee met, the book was rejected; consequently the member of Council who was saddled with it, now has the pleasure of presenting it to the Pharmaceutical Society.

"April, 1850."

Another instance in point was the case of his subscription to the Pharmaceutical Society, which he was in the habit of giving annually, having objected to compound for it. A few weeks before his death, however, he sent and paid his *Life subscription*.

One of the most useful agents in promoting the advancement of Pharmacy in this country, has been the *Pharmaceutical Journal*. The first number appeared in July, 1841, and, with the five succeeding numbers, was intended by Mr. Bell as an experiment, to test the necessity for such a journal. At the termination of this period "the influx of scientific papers," to quote his own words, "and various communications from correspondents on subjects relating to the Society, had increased to such an extent, that it was found difficult to restrict the dimensions of each number within the prescribed limits. The advantage resulting from a periodical interchange of ideas among the Members of the Society, became so obvious, that all doubt as to the practicability of maintaining a journal of Pharmacy was at an end. The *Pharmaceutical Journal and Trans-*

actions was, therefore, continued with regularity, remaining under the superintendence of Mr. Bell until the completion of the eighteenth and last volume. The disinterestedness with which he pursued this labour for eighteen years is very remarkable. From the low price at which the Journal was supplied to the Society it was never, notwithstanding its large circulation, a source of income; on the contrary, until the last three years, when through advertisements and increased sale it about paid its expenses, the deficit which he had to make up varied from £30 to £60 per annum.

For the office of editor his literary tastes, general acquaintance with science, and ever-ready pen, proved important qualifications. Nor should we omit to add the happy wit and conciliatory tone that pervaded his editorial articles. As editor, Mr. Bell constantly contributed the leading articles, which appeared, as is customary, without their author's name. Many papers, however, upon purely practical subjects, were furnished by his pen, and bore his name; and his last communication, which was not published until after his death, was a paper on Concentrated Infusions and Decoctions.

Previous to the existence of the *Pharmaceutical Journal* we find him an occasional contributor to the *Lancet*. A letter, signed *Pertinax*, published in that journal 11th Feb., 1837, containing some capital practical criticisms on the capricious changes of nomenclature introduced into the Pharmacopœia of 1836, was from the pen of Jacob Bell. A second letter, on "*The New London Pharmacopœia unsuitable for its proper purposes,*" appeared in the same journal Aug. 17, 1839.

These professional labours were not unappreciated by the Pharmaceutists of other countries, and Mr. Bell was an honorary member of various foreign scientific societies, of which we may enumerate the Philadelphia College of Pharmacy, the Société de Pharmacie de Bruxelles, the Société de Pharmacie d'Anvers, the Société d'Emulation et de Prévoyance des Pharmaciens de l'Est, le Cercle Medico-Chimique et Pharmaceutique de Liège, the Medico-Physical Society of Erlangen, and the Sociedade Pharmacentica of Lisbon; he was also a Fellow of the Chemical, Linnean, and Zoological Societies of London, and of the Society of Arts.

The incorporation of the Pharmaceutical Society by Royal Charter, which took place in the year 1843, though an acknowledgment of the importance of the interests of Pharmacy, did not convey those powers and privileges which might enable the Society to exercise its proper influence in restricting the practice of pharmacy to persons duly qualified. Nothing short of an Act of Parliament could do this; and to obtain such an Act, the strenuous exertions of the Society were directed.

In December, 1845, we find Mr. Bell thus defining the leading objects of such a measure:—

> "1. The registration of all persons carrying on business as Chemists and Druggists.
>
> "2. The introduction of a regular and uniform education for our body throughout the country.
>
> "3. The examination of all persons who may hereafter enter the business.
>
> "4. The protection of the public against the proceedings of ignorant persons assuming the title and office of Pharmaceutical Chemists.
>
> "5. The separation of the trade in Medicines from the practice of Physic and Surgery, as far as this is practicable.
>
> "6. The recognition of the Pharmaceutical Society as the governing body in our department, represented by a Council annually elected from among the Members at large; having power to superintend the education, examination, and registration, and to make such regulations as may be requisite from time to time respecting other matters relating to Pharmacy, in which the interests of our body and the welfare of the public are concerned."*

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* *Pharmaceutical Journal*, vol. v., p. 245.

During the year 1846, the subject of Pharmaceutical legislation was much discussed, and numerous petitions to Parliament in favour of some measure to promote education among the dispensers of medicine, were presented. In July of the following year, it became evident that, owing to the pressure of other business and the position of the Government in reference to a dissolution of Parliament, the hopes that were entertained of a Pharmaceutical Bill being passed during the current session, would not be realized.

A deputation of the Society to the Secretary of State in the following November, again urged the subject upon the Government, which, although admitting its importance as a branch of Medical Reform, declined to take it up as a separate question.

Obstacles continued to impede the progress of Pharmaceutical legislation. Mr. Warburton, who had undertaken to bring forward the subject in the House of Commons, left Parliament, and no Member having similar experience in medical affairs appeared to succeed him. The difficulty was to get the subject brought before Parliament by some one perfectly familiar with all its details, and at the same time possessing zeal, industry, and determination sufficient to neutralize the apathy and distaste with which it was regarded by many Members of the Legislature.

The accomplishment of this object had long occupied the attention of Mr. Bell, and as a solution of the difficulty, he at length resolved to offer himself as a candidate for a seat in Parliament, and so acquire as a right the opportunity of advocating in the House of Commons the subject he had so much at heart. But he had as yet never been much interested in politics, and, strange as it may appear, he was so little versed in political affairs, that he actually did not know with which party his principles would lead him to associate. However, upon the death of Mr. Raphael in November, 1850, and the consequent vacancy in the representation of St. Albans, Mr. Bell decided upon offering himself as a Liberal candidate for that borough.

But the "free and independent electors" of St. Albans were by no means disposed to accept the first candidate that offered, and thus forego so interesting an occasion as a contested election. A rival candidate in the Conservative interest was, therefore, brought forward; and although upon the election that took place on the 24th December, 1850, Mr. Bell was returned by a considerable majority, the unscrupulousness of the means employed by his agents upon that occasion was such that a petition was presented which led to the ultimate disfranchisement of the borough. These proceedings were ever after a source of regret to Mr. Bell, and were the occasion at the time of many unpleasant reflections being cast upon him. But in the opinion of those most fully acquainted with the circumstances, he was more sinned against than sinning. That he showed a laxity in placing himself so fully as he did in the hands of his parliamentary agent, we cannot deny. But we are convinced that his doing so was a consequence of his ignorance of electioneering practices, and that had he been any other than a novice at political life he would have exercised to a much greater extent that prudence which he was wont to display under other circumstances.

The great object with which Mr. Bell had entered Parliament, was to secure an Act for the regulation of Pharmacy; and in June, 1851, we find him moving for leave to bring in a "*Bill to Regulate the Qualifications of Pharmaceutical Chemists, and for other purposes in connexion with the Practice of Pharmacy.*" This was granted; the Pharmacy Bill was introduced and read a first time. But the able and zealous advocacy of Mr. Bell was not sufficient to convince the House of Commons of the necessity of the measure, and although the Bill was read a second time, this was done only upon condition that it should not be pressed forward during the then present session.

Nothing daunted with his want of success, Mr. Bell, early in the session of 1852, again moved for permission to bring in a Bill to Regulate the Qualifications

of Pharmaceutical Chemists. Although opposed by the late Mr. Hume, permission was obtained, and the Pharmacy Bill of the former session, in a somewhat altered form, was read for a first time. Upon the occasion of the second reading, which took place 17th March, Mr. Bell, in presenting a number of petitions in favour of the Bill, explained in a speech of some length the objects and provisions with which it had been framed, and at the same time refuted the erroneous impression that the measure in view was designed to create a trade monopoly. In conclusion, he moved for a Select Committee to which the Bill might be referred. To this proposition the House acceded not unwillingly. It was a favourable opportunity for delaying a measure that was regarded with some suspicion; it afforded the means of acquiring additional information; and last, but not least, it gave opportunity for the introduction of innumerable alterations, technically, though often incorrectly, called "*amendments.*" The Select Committee held several sittings, and received evidence from Physicians, Surgeons, General Practitioners, and Pharmaceutists, the result of which showed that Pharmacy in Great Britain was in a state contrasting very unfavourably with that in which it was existing in other European countries. But though all seemed to point to the necessity of some legislative interference, the contrary view was taken, and the Bill, instead of being rendered more effective, was deprived, to a great extent, of those provisions which were calculated to render it a practical and important measure.

Mr. Bell was deeply disappointed. The Bill was no longer that which he had introduced, but it was all that the Government would assent to; and the question was between it as "amended" by the Committee, and—none. The former alternative was preferable. The Bill fell far short of what it was hoped might be obtained, but it was a legislative measure in the right direction, and perhaps a prelude to one that promised greater efficiency.

Such were the arguments that Mr. Bell used at the Eleventh Annual Meeting of the Pharmaceutical Society. The Members present concurred with them, and it was the unanimous opinion that every exertion should be used to pass the Bill. The result is well known: the Act for regulating the Qualifications of Pharmaceutical Chemists passed both Houses of Parliament, and finally received the royal assent, 30th June, 1852.

Upon the dissolution of Parliament, and the General Election in the summer of 1852, Mr. Bell offered himself for the representation of Great Marlow, but was not successful. In 1854, upon the death of Lord Dudley Stuart, he contested the borough of Marylebone with Viscount Ebrington, but also without success; although upon this occasion he polled more votes than the successful candidate had polled at the previous election. When in the present year he was solicited to offer himself for the same borough, and with every prospect of being returned without opposition, his health was such that he was compelled reluctantly to decline the honour.

But though a Parliamentary career did not open to Mr. Bell, his interest in public matters allowed him to lead no useless or idle life. With the exception of a short visit to Paris in the year 1855, and a tour of a few weeks on the Continent in 1856, he scarcely ever left London for more than two or three days at once. To this unceasing occupation, and utter forgetfulness of his own bodily powers, must be attributed the long and gradual decline in his health, which was unhappily terminated by death in June last. The commencement of the malady which proved so serious, may be traced back as far as the year 1854, when having to address several public meetings on the occasion of the Marylebone election, he contracted an ulceration of the larynx, from which he never thoroughly recovered.

The latter part of last year found Mr. Bell in an exceedingly precarious state of health; and although he always steadily refused to try the effect of wintering abroad, he acceded to the wishes of his physician so far as to spend several weeks at Hastings. His complaint, however, had too strong a hold; not only were

the old symptoms unimproved, but debility and emaciation were added to them. He continued, however, to be actively occupied; the proceedings in Parliament with reference to the Sale of Poisons Bill he watched with the utmost vigilance; the Meetings of the Council of the Pharmaceutical Society he still attended with regularity, though unable to speak louder than in a whisper; an exhibition of his pictures for the benefit of the Marylebone Literary and Scientific Institution, of which he was President, was organized during his sojourn at Hastings. In May he removed to Tunbridge Wells, where he had the pleasure of unexpectedly renewing a friendship of childhood, in frequently meeting the estimable incumbent of Trinity Church, the Rev. Edward Hoare. On the 18th May he presided at the Anniversary Meeting of the Pharmaceutical Society, for which occasion, being unable to speak, he had prepared an admirable written address. At the meeting of the Council held on the 1st June, he again presided, but it was for the last time. Harassed with cough and debilitated by want of nourishment, which the diseased state of his throat prevented him from taking, his feebleness increased day by day. His mental activity, however, remained unimpaired, and so little did he regard his weakness, that up to the last he did not keep his bed or desist from writing and conversation. But the vital powers were fast ebbing, and upon the evening of Sunday, the 12th June, he expired. His remains were interred in the cemetery of Tunbridge Wells, in a spot which he had himself selected, adjoining the grave of the late Dr. Golding Bird.

On reviewing the life of Jacob Bell, cut short, alas! at the early age of 49 years, there are many points of interest that present themselves to our consideration. Blessed with more than average natural abilities, these innate advantages were developed by a good education. His natural taste for the fine arts was carefully cultivated, and when he had the means of gratifying it, he did so with intelligence and judgment. An early training in business gave him practical experience in the affairs of life, and also strengthened his habits of industry and perseverance. Energy was natural to him, and whatever he undertook, even from childhood, he pursued with spirit. Another feature of his character, though but little known, was exhibited in his numerous acts of private benevolence, and few who have experienced his benefactions will forget the sympathy and delicacy with which they were administered. But in these, as in other cases, he would take no credit to himself, or care to place himself to the best advantage; hence his motives sometimes failed to be fully appreciated. Those who knew him best, however, can testify to the uncommon disinterestedness that marked his conduct upon all occasions, and which was remarkably exhibited in the happy tact and conciliatory manner with which he treated those questions that occasioned a difference of opinion.

Mr. Bell's genial good-nature, ready wit, and happy conversational powers, his taste for literature and science, and extensive patronage of art, had gained for him friends from all circles of society. But though all deplore his loss, it is by his Pharmaceutical brethren that it will be most deeply and practically felt. For them he laboured assiduously and disinterestedly, and that for a period of eighteen years; and it is to his energy, wisdom, and perseverance that the advance which Pharmacy in this country has happily undergone, is largely attributable.

But little as we are disposed to underestimate the loss which the Pharmaceutical Society has sustained in the death of one who has devoted the best energies of a life to its service, we yet reflect that at no other period of its existence could such an event have occurred when its effects would have been less serious. Thanks to the unremitting labours of its late President, the necessity for Pharmaceutical education, and the true position of those engaged in the practice of Pharmacy, are now recognized by all, and whatever changes the Society may have to undergo, the utility and importance of its objects are such as ensure for it the position of a necessary institution of the country.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *3rd August*, 1859,

Present—Messrs. Bird, Bottle, Brew, Bucklee, Cupiss, Davenport, Deane, Hanbury, Haselden, Lescher, Meggeson, Morson, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

Perrot, Pierre Bénoni .....Mauritius
Richardson, John G. F. .....Leicester

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL.

	£	*s.*	*d.*
Acton, W., 46, Queen Anne Street	2	2	0
A Friend, Manchester	1	1	0
Amos, D., Canterbury	1	0	0
Andrews, John Betts, Clare	1	1	0
Anthony, John Lilley, 338, Oxford Street	1	1	0
Applebury, —, Stockport	1	1	0
Atkinson, Matthew, Manchester	1	0	0
Attwood, G., Brompton	1	1	0
Aubin, James, Jersey	1	1	0
Bailey, J. D., 30, Conduit Street	5	5	0
Baldock, J. H., London	1	1	0
Balkwill, F. P., and Son, Plymouth	0	10	0
Ball, G. V., Banbury	1	1	0
Ballard, Edwin, Farringdon	1	1	0
Bancroft, —, Halifax	0	5	0
Barber, G., Liverpool	1	1	0
Barlow, —, Manchester	0	10	6
Barnard, John, 1, Oxford Terrace, Clapham Road	5	5	0
Barnes, J. B., 1, Trevor Terrace, Knightsbridge	1	1	0
Barnes, Edwin, Durham	0	10	6
Bartlett, W., 1, Brettin Terrace, Chelsea	1	1	0
Bateman, J. B., Manchester	1	1	0
Battley and Watts, 32, Whitecross Street	10	10	0
Beard and Holt, Manchester	1	1	0
Beaumont, W. H., Gravesend	1	1	0
Bell, J., Manchester	0	5	0
Bell, W., Carlisle	1	1	0
Bennett, G., 338, Oxford Street	1	1	0
Bentley, Robert, 2, Clarendon Villas, Hampstead	5	5	0
Berry, H. J., Worthing	0	10	6
Binge, Thomas, 23, Stockbridge Terrace, Pimlico	1	1	0
Binns, S., Sheffield	1	1	0
Bird, Augustus, 22, High Street, Kensington	5	5	0
Bird, William L., 42, Castle Street East	5	5	0
Bishop, Thomas, Woolwich	1	1	0
Bishop, A., Speck's Fields, Mile End	1	1	0
Blackmore, M., Bonchurch	2	2	0
Blacklock, H., Bournemouth	1	1	0
Blacklock, J. D., Brighton	1	1	0
Blake, W. F., Stroud	1	1	0
Bond, C., Leamington	0	10	6

	£	s.	d.
Botham, W., Manchester	0	5	0
Bottle, Alexander, Dover	5	5	0
Bowerbank, J., Cockermouth	1	1	0
Bowerbank, F., Cockermouth	1	1	0
Bowker, J., Manchester	0	10	6
Brace, G., 25, Cavendish Square	21	0	0
Bradley and Bourdas, 10, Pont Street, Belgravia	10	10	0
Brady, Henry B., Newcastle-on-Tyne	1	1	0
Braithwaite, J. C., 17, Bloomsbury Square	1	1	0
Bransby, W., Thirsk	0	1	6
Bremner, W., Thurso	1	0	0
Bremridge, Elias, 17, Bloomsbury Square	5	5	0
Brereton, J., Manchester	1	1	0
Brew, Thomas A., Brighton	5	5	0
Brewer, John, 5, Liverpool Street	1	1	0
Britten, T., Liverpool	1	1	0
Brown, W. S., Manchester	3	3	0
Bucklee, Wm. H., 86, New Bond Street	5	5	0
Bullock, W., Manchester	0	10	6
Buss, T., Market Harborough	2	2	0
Caley, A. J., Norwich	2	2	0
Carter, W., Manchester	1	1	0
Chaplin, L., Colchester	1	1	0
Chater, E. M., Watford	0	10	6
Chater, J., Watford	1	1	0
Cheese, —, Jersey	0	10	6
Cherry, E., Monmouth	0	10	6
Chrispin, W., Ripon	0	10	0
Churchill, John, 11, New Burlington Street	10	10	0
Clark, W., Clifton	1	1	0
Clarke, W. R., Leighton	1	1	0
Clarke, W., Longsight	0	10	0
Clarke, T. M., Richmond	1	1	0
Clay and Abraham, Liverpool	10	10	0
Cockeram, W., 277, Oxford Street	1	1	0
Cocksedge, H. B., 20, Bucklersbury	1	1	0
Cockton, John, Maryport	1	1	0
Coffey, John A., Providence Row, Finsbury	1	1	0
Colbeck, G. R., Leamington	1	1	0
Coleman, J., Cardiff	1	1	0
Collier, W., Sheffield	1	1	0
Cortis, C., Worthing	2	2	0
Cottee, W., Salford	0	5	0
Coupland, H., Liverpool	1	1	0
Cowell, S., Canterbury	1	0	0
Cracknell, C., 107, Edgware Road	5	5	0
Cranford, H. L., Thirsk	0	2	6
Cropper, J., Long Sutton	0	10	0
Cross, W., Cardiff	1	1	0
Crowe, T. L., 174, Regent Street	0	10	6
Crowther, T., Tickhill	1	1	0
Cutting, J. B., Leamington	1	1	0
Daines, Thomas, 338, Oxford Street	1	1	0
Dakin, J., Liverpool	2	2	0
Darby, Stephen, 140, Leadenhall Street	5	5	0
Davenport, John T., 33, Great Russell Street	5	5	0
Davenport, E., St. Albans	1	1	0

	£	s.	d.
Davis, D. F., Leominster	1	1	0
Davis, John Oliver, Folkestone	1	1	0
Davy, Macmurdo, and Co., 100, Upper Thames Street	10	10	0
Deane, Henry, Clapham	5	5	0
Densham, J. B., Plymouth	0	10	0
Dimsdale and Co., Messrs., Cornhill	10	10	0
Dobson, J., Keswick	0	10	6
Down, John, 1, Queen's Road, Bayswater	2	2	0
Drew, Barron, and Co., 2, Bush Lane	10	10	0
Duprey, J. A. B., Jersey	0	10	6
Dutton, J., Birkenhead	2	2	0
Edwards, Dr., Liverpool	5	5	0
Ellis, Richard, Thornbury	0	5	0
Ereaut, John, Jersey	1	1	0
Ereaut, John, jun., Jersey	0	10	6
Ereaut, G., Jersey	1	1	0
Evans and Lescher, 60, Bartholomew Close	10	10	0
Evans, W. D., Newport, Monmouth	0	10	6
Evans, H. S., Liverpool	5	5	0
Faulconer and Steedman, Keen's Row, Walworth	10	10	0
Faulkner, H., Monmouth	0	10	6
Fletcher and Palmer, Cheltenham	10	10	0
Foggitt, W., Thirsk	0	10	0
Foggitt, T. J., Thirsk	0	10	0
Forbes, W., Reigate	1	1	0
Forrest, R., 9, Celbridge Place, Westbourne Park	1	1	0
Francis, H., Melbourne	2	2	0
Gale, Samuel, 338, Oxford Street	2	2	0
Garle, John, 12, Kensington Terrace	5	5	0
Gay, G., Stroud	1	1	0
Geldard, R. K., Plymouth	0	10	0
Gibbons, W., Plymouth	0	10	0
Gibbons, J. G., Manchester	6	6	0
Gill, S., Pendleton	0	10	6
Glaiser, Taylor, & Co., Manchester	2	2	0
Glover, S., Liverpool	1	1	0
Goldfinch, G., 15, Goswell Road	0	5	0
Goode, T., 47, Minories	5	5	0
Goodwin, J., Lower Clapton	2	2	0
Gordelier, P. W. G., Sittingbourne	1	1	0
Graham, Thomas, F.R.S., Royal Mint	5	5	0
Granger, —, Jersey	0	2	0
Greaves, R., Ripon	1	0	0
Green, C. S., Stratford-on-Avon	0	10	6
Greenough, G., Manchester	1	1	0
Griffiths, J., Manchester	0	10	6
Groves, H., 338, Oxford Street	1	1	0
Groves, T. B., Weymouth	2	2	0
Gwatkin, J. T., Brighton	1	1	0
Gwillim, J. C., Newport, Monmouth	1	1	0
Hall, J. R., Canterbury	1	0	0
Hallaway, J., Carlisle	1	1	0
Halliday, W. J., 177, Regent Street	1	1	0
Hallsworth, T., Manchester	0	5	0
Hambrook, O., Dover	1	1	0
Hammon, Richard, Folkestone	1	1	0
Hanbury, Daniel Bell, Plough Court	21	0	0

	£	s.	d.
Hanbury, D., Plough Court, Lombard Street	10	10	0
Harding, T. H., 19, Park Square, Regent's Park	1	1	0
Hargreaves, H. L., Oldham	1	1	0
Harrison, J. P., Carlisle	1	1	0
Harvey and Reynolds, Leeds	5	5	0
Haselden, Adolphus F., 18, Conduit Street	5	5	0
Hayward, C., Manchester	3	3	0
Heath, E., Cromer	1	1	0
Herring and Co., 40, Aldersgate Street	10	10	0
Hick, A., Wath upon Dearne	1	1	0
Higgins and Cattle, Liverpool	5	5	0
Hill, J., Sheffield	1	1	0
Hills, Thomas Hyde, 338, Oxford Street	105	0	0
Hinton, H. A., London	1	1	0
Hitchcock, C., Colchester	1	1	0
Hockin and Co., 38, Duke Street, Manchester Square	5	5	0
Hodgkinsons, Tonge, and Co., 213, Upper Thames Street	10	10	0
Holland, R. L., Esq., 34, Queen Ann Street	2	2	0
Holt, I., Manchester	0	10	6
Hooper, William, Great Russell Street, Covent Garden	5	5	0
Hopkinson, —, Manchester	1	2	6
Hopwood, H. J. S., Richmond	1	1	0
Horner, Messrs., and Sons, 20, Bucklersbury	10	10	0
Howard, J., Manchester	2	2	0
Howell, M., Peckham	1	1	0
Howroyd, —, Manchester	0	10	6
Hughes, G. H., jun., Holyhead	1	1	0
Humpage, B., 44, Chancery Lane	2	2	0
Hunter, J., Gosport	0	10	6
Ingham, R. H., Manchester	1	1	0
Jackson, T., Manchester	1	1	0
Jackson, J., 47, Southampton Row	2	2	0
James, J. P., Cardiff	1	1	0
Jenner, William M., Sandgate	1	1	0
Jennings, J. E. H., Sheffield	1	1	0
Jennings, W., Halifax	0	10	6
Johnson, J. H. and S., Liverpool	5	5	0
Jones, P., 11, Norton Folgate	5	5	0
Jones, T. J., Newport	1	1	0
Jones, S. U., Leamington	0	10	0
Jones, C., Birkenhead	1	1	0
Jones, J., Salford	1	1	0
Joy, F. W., Cardiff	2	2	0
Judson, T., Ripon	1	0	0
Keene, A., Leamington	0	10	0
Kellett, —, Manchester	0	10	6
Kennington, A., Jersey	0	10	0
Kent, A., Basingstoke	3	3	0
Kernot, George C., 2, Chrisp Street, Poplar	1	1	0
Lathbury, R., Liverpool	2	2	0
Lea and Perrins, Worcester	21	0	0
Le Feuvre, F., Jersey	0	10	6
Lewin and Cornish, Plymouth	0	10	0
Lloyd & Son, Richmond	1	1	0
Lockyer, George, Deptford	1	1	0
Long, H., Croydon	1	1	0
Luckombe and King, 86, Snow Hill	10	10	0

	£	s.	d.
Lynch, J. R., Manchester	1	1	0
Macfarlan, John F., Edinburgh	10	10	0
Machray, William, 338, Oxford Street	1	1	0
McGuffie, J. R., Liverpool	2	2	0
McMinn, —, Manchester	0	5	0
Madgwick, W. B., Southampton	1	0	0
Maggs, S. B., St. Leonards	0	10	6
Maleham, H., Sheffield	1	1	0
Manthorp, S., Colchester	1	1	0
Marks, G., Bradford-on-Avon	1	1	0
Marshall, C. E., 6, Bedford Street, Mile End	0	10	6
Mason, W., Hastings	1	1	0
Mason, J., Reigate	0	5	0
Mason, W. W., Manchester	0	5	0
Mather, W., Manchester	1	1	0
Matterson, E. H., Halifax	0	10	6
Matthews, W., 1, Wigmore Street	1	1	0
Maudsley, W., Preston	1	1	0
Maunder, F., Sheffield	1	1	0
Mawson, John, Newcastle-on-Tyne	1	1	0
May, E., Tewkesbury	1	1	0
Medley, W., Derby	1	1	0
Meggeson, George, 61, Cannon Street	5	5	0
Mercer, N., Liverpool	2	2	0
Middleton, Francis, 338, Oxford Street	2	2	0
Millais, T., Jersey	1	1	0
Mitchell, J., Manchester	0	10	6
Moore, James L., 1, Craven Place, Hyde Park	3	3	0
Morgan, W., Pillgwinlly	0	10	6
Morson, Thomas N. R., Queen's Square	21	0	0
Mount, J., Manchester	0	10	6
Mount, W., Canterbury	1	0	0
Moysey, W., Ilfracombe	1	1	0
Mumbray, R. G., Manchester	0	10	6
Mumby, C., Gosport	0	10	6
Munday, H., Manchester	0	5	0
Newlove, —, Manchester	0	10	6
Nicholson, J. J., 338, Oxford Street	1	1	0
Olliver, G. E., Weymouth	0	10	6
Orridge, Benjamin B., 30, Bucklersbury	10	10	0
Paine, Standen, Brighton	1	1	0
Paine, W., Canterbury	1	0	0
Palk, Edward, Southampton	1	1	0
Palmer, Robert, 33, Wilton Place, Belgrave Square	5	5	0
Parker, T., Halifax	0	10	6
Parsons, W., Portsmouth	0	10	6
Peake, H., Dover	1	1	0
Peatson, H. R., Salford	0	10	6
Pedler, Geo. S., 199, Fleet Street	5	5	0
Penton, C. W., Tunbridge Wells	1	1	0
Phillips, E. James, Newport, Monmouth	1	1	0
Phillips, John, Newport, Monmouth	1	1	0
Philpot, A. W., Maidstone	0	10	6
Pickup, J., Manchester	1	1	0
Pickup, V., Salford	0	10	6
Piquet, John, Jersey	0	10	6
Pochin, H. D., Manchester	2	2	0

	£	s.	£.
Pollock, Thomas, 129, Fenchurch Street	3	3	0
Procter, W., Liverpool	1	1	0
Proctor, William, Newcastle-on-Tyne	1	1	0
Proctor, Barnard S., Newcastle-on-Tyne	1	1	0
Pyne, J. J., Manchester	5	5	0
Randall and Son, Messrs., Southampton	5	0	0
Ransome, T.. Manchester	5	5	0
Reddish & Co., Salford	1	1	0
Redfern, J., Ashby-de-la-Zouch	1	1	0
Redwood, T., 19, Montague Street, Russell Square	5	5	0
Richardson, A., Manchester	0	10	6
Roberton, J., Manchester	1	1	0
Robinson, B., Pendleton	0	10	6
Rogers, Arnold, and Sons, 16, Hanover Square	21	0	0
Rouse, F. J., Clapham	1	1	0
Rowe, J., Plymouth	0	10	0
Russell, C. J. L., Windsor	1	1	0
Salisbury, W. B., Leicester	2	2	0
Salisbury, J., Sheffield	1	1	0
Sandford, G. W., 47, Piccadilly	5	5	0
Sanger, J., 150, Oxford Street	5	5	0
Sanger, W. A., 150, Oxford Street	1	1	0
Savory, J., 143, New Bond Street	5	5	0
Seaton, C. A., Sherborne	1	1	0
Seddon, —, Manchester	1	1	0
Sewell, jun., J., Sheffield	1	1	0
Sharp, C., 17, Bloomsbury Square	0	10	6
Sharpe, G. Y., 6, Kensington Terrace	1	1	0
Sharpe, J., Salford	1	1	0
Shaw, A. H., Stockport	5	5	0
Shaw, J., Liverpool	1	1	0
Sircom, R., Bristol	1	1	0
Smale, T. C., Ripon	0	10	0
Smeeton and Son, Leeds	5	5	0
Smeeton, W., Ironbridge	1	1	0
Smith, G. W., 51, Hove Villas, Brighton	5	5	0
Spearing, J., Southampton	1	1	0
Spencer, T., Wokingham	1	1	0
Squire, Peter, 277, Oxford Street	21	0	0
Standring, T., Manchester	10	10	0
Standring, J., Manchester	1	1	0
Stanford, E. C., Worthing	1	1	0
Stott, J., Thirsk	0	1	6
Stroud, J., Bristol	1	1	0
Sumner and Co., Liverpool	5	5	0
Sutterby, J. N., Long Sutton	0	10	0
Taylor, J., 13, Baker Street	1	1	0
Taylor, S., Pendleton	0	10	6
Teasdale, T. B., Darlington	1	1	0
Thomas, J. H., Boston	1	1	0
Thomas, R., East Looe	1	1	0
Thomas, J. J., Stoke Newington	2	2	0
Thompson, J., Thirsk	1	0	0
Thompson, J. R., Thirsk	0	10	0
Thompson, A., Carlisle	1	1	0
Thompson, T., Richmond, Yorkshire	1	1	0
Tomlinson, T., Manchester	1	1	0

	£	s.	d.
Towle, —, Manchester	0	5	0
Truman, F. C., Jersey	0	10	0
Tuke, Dr., Chiswick	1	1	0
Ure, Alexander, F.R.C.S., 18, Upper Seymour Street	3	3	0
Veitch, William, Shildon	1	0	0
Walker, T. D., Liverpool	1	1	0
Walsh, E., Manchester	0	5	0
Ward, J., Falkingham	1	1	0
Warner and Barclay, 55, Fore Street	10	10	0
Waugh, George, 177, Regent Street.	21	0	0
Waugh, Alexander, 177, Regent Street	5	5	0
West, —, Manchester	0	5	0
Westmacott, G., Manchester	1	1	0
Weston, Charles, Lincoln	1	1	0
Wharrie, D., Liverpool	1	1	0
Whiting, C., Beaufort House	10	10	0
Whitwell, J., Thirsk	0	10	0
Wigg, Henry John, Lynn	1	1	0
Wilde, E.	0	5	0
Wilkinson, W., Manchester	1	1	0
Williams, H. L., Newport, Monmouth	1	1	0
Williams, E., Manchester	0	10	6
Williams, T. J., Liverpool	1	1	0
Wilson, W., Sheffield	1	1	0
Witherington, T., Worcester	2	2	0
Wood, B., Halifax	1	1	0
Wood, C. H., 17, Bloomsbury Square	0	10	6
Woolley, G. S., Manchester	5	5	0
Wright, C., Manchester	1	1	0
Wright, J., Manchester	0	5	0
Wright, W., Liverpool	1	1	0
Wright and Francis, 11, Old Fish Street	10	10	0
Wylde, John, Manchester	1	1	0
Young, G., Millwall	0	10	0

NORTH BRITISH BRANCH.

COUNCIL MEETING IN EDINBURGH.

At a meeting of Council held in Edinburgh, on Saturday, 13th August, Mr. J. R. Young, Vice-President, in the chair, the following resolution was proposed by the Chairman, and unanimously adopted by the meeting:—

"The Council cordially concur in approving of the proposed establishment of Pharmaceutical Scholarships in connexion with the Society, as a memorial of their late President and Founder, Mr. Jacob Bell.

"That the Secretary be requested to issue circulars to the Members and Associates throughout Scotland generally, requesting their co-operation in reference to the '*Bell Memorial*,' and further, to take such steps regarding local subscriptions as shall be considered best suited to aid the object in view."

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

At a meeting of Council of this Association, held August 11th, the subject of the Jacob Bell Memorial was introduced by Dr. Edwards giving some information as to what had been done in London, and the steps that had been taken in furthering that object.

The Council warmly approved of the contemplated Memorial, and were unanimous in their desire to aid the efforts of the London Committee, and all the Members present at once handed in their names to the Secretary as subscribers to the fund.

The following resolution was also proposed and immediately adopted:—

"That in the opinion of this Council it is advisable to assist in raising funds for the 'Bell Memorial,' and in order to carry out this object, the Secretary be authorized to issue a circular to all the Chemists in Liverpool, appending thereto a list of the local subscriptions up to the date of issue."

MANCHESTER PHARMACEUTICAL ASSOCIATION.

PROCEEDINGS IN AID OF THE "BELL MEMORIAL FUND."

Some Members of the Society at Manchester, desiring to obtain contributions to the "Bell Memorial Fund" from that city and its vicinity, considered that the best means of doing so would be to have a meeting of those likely to take an interest in the matter, and accordingly a circular was sent by the local Secretary to all the Members of the Society in the neighbourhood, and to several of the more influential non-members, appointing a meeting, which was held at the Clarence Hotel, on the 1st August.

Mr. Standring was called to the chair, who introduced the subject to the meeting, and explained the proceedings of the Council of the Pharmaceutical Society in the matter, and spoke highly of the late Mr. Bell's exertions on behalf of the Society, and of the Chemists generally.

The following resolution was moved by Mr. Robertson, seconded by Mr. T. Jackson, and supported by Mr. H. D. Pochin:—

"That the Council of the Pharmaceutical Society, having determined on the establishment of Pharmaceutical Scholarships as a memorial of the late Mr. Jacob Bell, resolved that this meeting will heartily co-operate in that object."

A Committee was afterwards appointed to carry out the foregoing resolution.

ORIGINAL AND EXTRACTED ARTICLES.

ON PROVINCIAL SCHOOLS OF PHARMACY.

BY MR. H. B. BRADY.

If we view the Pharmaceutical Society as an *educational* body, and compare the extent of its educational resources with the number of young men who enter our profession, we cannot help being discouraged by its palpable insufficiency. But had the Society means and convenience for the scientific training of all these young men, how small is the proportion of them who could devote the necessary time, or could suitably incur the expense, which the curriculum at the "Square" involves. I speak, of course, with especial reference to those who are resident in the provinces, constituting as they do a large majority of the class referred to; to the London Pupils and Associates my remarks do not apply: if they do not

make use of the facilities the Society affords, they have commonly only themselves to blame, and they will find out, when too late, how great is the loss they have sustained by their negligence.

It becomes, therefore, an important question how the educational influence of the Society may be best extended. The answer, I think, is obvious; by the association of Members in different localities, and the establishment of classes for the study of the principal branches of science, a knowledge of which is essential to the educated Pharmaceutist.

There are few large towns in the kingdom in which Schools of Pharmacy of a greater or less extent might not be carried on. They cannot, it is true, except in a few of our very largest cities, assume any form at all comparable to the metropolitan one; it is neither essential nor desirable that they should do so. Except in these very large cities, such institutions can hardly be made self-supporting. A quiet inexpensive usefulness is therefore to be sought, rather than a complete but costly establishment.

Two or three Pharmaceutists, really in earnest, may almost anywhere do much to improve the intellectual character of the young men in their locality; but it will seldom happen that these will have to work alone; when a start has once been made, the movement will commonly meet with sympathy and support from most influential principals, at any rate from all whose sympathy is worth having.

After determining to do something, the first question seems to be—How much is it advisable to attempt? The danger is rather in attempting too much than too little. The first part of the work is relatively the hardest; it is easy to increase from a small beginning, not so easy to reduce an over elaborate programme without dissatisfaction. A couple of short courses of lectures are sufficient to create an interest in the movement, and according to the success of these, future operations must depend. If difficulty be felt, at first, in obtaining lecturers, there will always be found those who are willing and able to devote an hour or two per week with the young men, and this given up to rational discussion on scientific subjects, could not fail to be of great use, and would act as an incitement to them in the pursuit of scientific reading and inquiry. If we delay doing good until opportunity offers to do it on a large scale, it will usually remain undone.

It is necessary to bear in mind the fact that in provincial towns the number of young men in the profession is limited, and as the changes year by year are not sufficiently numerous to bring forward an entirely new set of students, the courses of lectures, &c., must be arranged so that the interest of the same class shall be kept up for a series of years. There must, of necessity, be some fees attached to the lectures to assist in defraying the expenses inseparably connected with them, but these should be kept as low as possible, in consideration of the fact that, to those for whose benefit they are especially intended, outlay is an object of some importance. Perhaps the best plan is to have the fees paid in one sum as an annual subscription, entitling the subscriber to admission to whatever lectures or meetings are held during the year. The treasurer's report, at the end of the year, will commonly be found to show a deficiency—especially if the number of students be not large; this, however, is usually pretty easily adjusted by a subscription amongst the Members themselves.

Some of the readers of the *Pharmaceutical Journal* may recollect that a few months ago a notice appeared in its pages of an effort which was being made in Newcastle to establish a school after the plan I have mentioned. It was an object in which our late worthy President took great interest, and it seems to me possible that there may be those to whom the little experience already afforded by the experiment may not be wholly useless. Whilst the Poison Bill was before Parliament, the Pharmaceutists of this vicinity as well as many other places were called together to consider in what way its provisions might affect their interests. Opportunity was taken at the meetings to discuss the possibility

of commencing classes, to encourage and assist scientific reading amongst the young men engaged in the various establishments in the town. The young men themselves had signified a wish that something of this kind should be done. It is not necessary to detail the different phases the matter assumed, but the result was, that in a very little time we found ourselves located in a comfortable lecture-room, with some twenty students, and a programme of about six-and-twenty lectures for the summer's work.

These are now all delivered, and we look back upon our first session with satisfaction; and in no way is this more complete, than in reviewing the regularity and attention of the students.

Our prospect for the winter is not less encouraging. A professional gentleman of good scientific standing, and considerable experience, has volunteered a course of twenty lectures on Chemistry, and one of our own Members has offered a somewhat shorter course on Inorganic Materia Medica, both to commence in October. In the matter of funds we are not far amiss; our balance in hand will perhaps hardly carry us through the year, but there are still some of our Members interested in the cause who have not been called upon for subscriptions.

If at the end of our first year it should happen that we are unable, or find it undesirable, to continue the lectures, we shall simply suspend our operations; and we believe the proportion of benefit derived will bear a fair relation to the money laid out, but we have a well-founded hope that we shall be able to continue from year to year, doing a little good in a quiet way.

In conclusion, I might just remark that, if the subscriptions from our locality to the Memorial to our late good and energetic President be not in amount or number equal to what might have been expected, judging from our number of Members, it must not be supposed that we are indifferent to the success of the object, or that we do not appreciate the disinterested labours to which the Society owes its very existence, but rather that the furnishing of our own rooms had previously absorbed such cash as we could spare for purposes of this kind.

Newcastle-on-Tyne, August, 1859.

FERRI IODIDI SYRUPUS.

BY MR. C. R. C. TICHBORNE.

This syrup, which holds a place in the three Pharmacopœias, is now greatly employed as being the most convenient mode of exhibiting iodide of iron. The formulæ for this article are, I think, open to improvement. Experience leads me to infer that a concentrated syrup, or one approaching perfect saturation with sugar, gives the best results as regards permanence, and that the greater amount of water it contains, the more prone it is to decomposition. I shall pass over those processes which recommend the whole of the water to be used in making the solution of iodide of iron, and then converting this into a syrup by the addition of sugar, and will confine myself to the consideration of what I think the better plan—viz. mixing solutions of sugar and iodide of iron. If we dissolve, by heat, 5 lbs. 8 oz. (avoirdupois) of sugar in two pints of water, we shall get a supersaturated syrup—*id est*, one that on cooling to 60° F. will have a specific gravity of 1.352. If we set this aside in a closed vessel, it will gradually begin to deposit crystals, until the syrup contains 67.2 per cent. of sugar, and stands something about 1.340; this seems to be the maximum density of a solution of loaf sugar at 60° F.* There is evidently an error going the round of the chemical works, regarding the solubility of cane-sugar; most works state that it dissolves in one-third of its weight of cold water, and one says that it is soluble in two-parts of water. (I think there can be no doubt of this latter statement.) Again, a French work says, "*Il se dissout dans le* ⅓ *de son poids d'eau froide*," &c. Now, if this was correct, a saturated syrup at 60° F. would

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* It appears to vary slightly in different varieties of sugar.

contain 75 per cent. of sugar ($75 + \frac{75}{3} = 100$), but from experiments I find that it contains only 67.2 per cent. of sugar and 32.8 per cent. of water, therefore a saturated solution contains a little less than one-third of its whole weight of water—*id est*, sugar dissolves in about half its weight of cold water.

By using the supersaturated syrup described above, and a small quantity of water for the solution of the iron, we get a very concentrated or non-aqueous product; *e. g.* if we add gradually, in a flask, five drachms of iodine to an excess of iron filings covered by an ounce of water, it is only necessary to keep it gently agitated for some time until the combination is nearly completed, and then to apply a gentle heat, that all traces of $Fe_2 I_3$ may be destroyed.

In filtering the green solution we should allow the extremity of the funnel to dip nearly to the bottom of the vessel into which the mixture is being filtered, at the same time pouring over gently a *known quantity* of the syrup, which, by floating upon the surface of the liquid in filter and receptacle, prevents the contact of the atmosphere. To this solution we now add seven fluid ounces of the strong syrup, *minus that used above*, in the filtering. This is a modification of the Dublin formula, containing half the quantity of water, which is replaced by syrup. Thus, when we only use sufficient water to maintain the solution of the ingredients, the syrup keeps remarkably well with ordinary care.

As regards the many proposed additions for its preservation, I think they are anything but desirable adjuncts, exclusion from the light and air, by keeping in earthen vessels well closed, being all that is required.

The addition of citric acid was, I believe, proposed some time since as a preservative agent. I have tried it, but experienced no benefit resulting from its use, except it be the rendering of the sugar more soluble—that is, by retarding the crystallizing of that substance; from this circumstance a larger quantity might be introduced.

I think that if a pill of iodide of iron were introduced, we could not do better than imitate the excellent pills of M. Blancard. One of these left exposed to the atmosphere for any reasonable time, will be found to be still intact, and to have not undergone the slightest decomposition, provided the external coating of balsam and reduced iron (*de fer porphyrisé*) be not broken.

THE SYRUP OF PHOSPHATE OF IRON.

We have received a letter from Dr. Medlock, Consulting Chemist to the General Apothecaries' Company, in explanation of the following passage of Mr. Haselden's paper, which appeared in the last number of this Journal:—

"There is but one more class of names which I shall at present venture to touch upon—that is, where several names are seemingly used towards the same preparation; and this is particularly to be observed in the syrup of phosphate of iron, sometimes called syrup of *super*phosphate of iron and sometimes syrup of *pyro*phosphate of iron. I have no doubt that generally the same preparation is looked for, but in the first, if prepared as the name would imply, an opaque syrup of an insoluble compound is the result; in the last two, an excess of acid to the phosphate enables the operator to produce a clear preparation, but this is uncertain in its strength and unstable in its nature. In order to meet this difficulty, the General Apothecaries' Company have introduced a preparation by the assistance or addition of citrate of ammonia to the phosphate of iron, and thus a preparation in scales is obtained, analogous to the ammonio-citrate of iron, which still sails under the name of pyrophosphate of iron. Thus the name, well-sounding in itself, is given to an article of which it does not truly represent its real character."

Dr. Medlock states that the phosphate of iron contained in the preparation of the General Apothecaries' Company referred to, is prepared by means of

pyrophosphate of soda, while in the case of superphosphate of iron, the ordinary tribasic phosphate is used. "The pyrophosphate of iron," he says, "has been found to dissolve very readily in a weak solution of basic citrate of ammonia, and of this the General Apothecaries' Company prepare a very elegant scale preparation, and also a greenish syrup, which is sold under its strictly correct name of syrup of pyrophosphate of iron."

We do not concur with the author in considering the name a strictly correct one, nor do we think that Dr. Medlock's statement tends in the slightest degree to invalidate the force of Mr. Haselden's remarks.

THE LEAD PANIC AT HASTINGS.

We have received from Dr. Garrett a printed pamphlet, intended only for private distribution, entitled "Sanitary Observations," but which appears to be simply a personal explanation on the part of the author of the recent discussion on the water of Hastings, which was first alleged by Dr. Garrett to be contaminated with lead. It will be remembered that this question was made the subject of comment in a leading article of the April number of this Journal, where it was stated that the whole subject had been investigated by the Local Board of Health, and by the Hastings Medical Society, but without detecting any ground for the assertion. Dr. Garrett, however, who refused to co-operate with these bodies, was not satisfied with their verdict, and in these "Observations" he undertakes to show that "their conclusions were in perfect contradiction to their evidence and analyses, and their verdict subversive of the best interests of the town."

As far as we can see, the only fresh evidence which he brings forward in his own favour, is taken from the report of Dr. Taylor, who received from the above Society seven samples of water, three of which, marked Nos. 1, 3, and 5, were taken from the reservoirs, and were sent with a view of ascertaining if they were capable of exerting any action on lead. Dr. Garrett says,

"Dr. Taylor states that he made the following experiment:—'Eight ounces of water were exposed in an open jar in contact with eight square inches of plumber's lead as it was used for cisterns, the surface of the metal having been previously cleaned but not polished—the result, he says, was that after forty-eight hours' contact of the lead with the water, "sample No. 5" was found to contain as much as one grain in five gallons of water.'"

The following are also extracts, quoted by Dr. Garrett from Dr. Taylor's report:—

"No. 5 *resembled pure soft water* derived from the beds of sand." "No. 5 water was remarkable for its comparative purity or freedom from saline matter. It contained a mere trace of sulphate of lime." Again, "No. 5 gave no indications of this salt (bicarbonate of lime)."

It appears, therefore, from the above, that the water marked No. 5 differs entirely in its composition from the others, Nos. 1 and 3, and is capable of exerting a slight action on metallic lead; but before any importance can be attached to the result, it must be stated to what extent this water is concerned in supplying the cisterns of the town. The result of Dr. Taylor's examination of the other four samples (taken from the cisterns), in which not a trace of lead was detected, although the test employed was "capable of revealing the presence of one-hundredth part of a grain in a gallon," Dr. Garrett accounts for by supposing it *most likely* that the water was drawn during the busy part of the day, and consequently had not had time to exert any action on the metal.

ON STARCH AND CELLULOSE AS CONSTITUENTS OF ANIMAL ORGANISMS.

A few years since the presence of starch or cellulose in any particular individual was regarded as an absolute proof of its vegetable nature, and hence many otherwise doubtful organisms were placed among plants. Of late years, however, the researches of physiologists have shown that these supposed absolute distinctive characters of plants are not to be depended upon, for they have succeeded in finding substances isomeric with starch and cellulose, and possessing similar chemical reactions to them in undoubted animals. As this is a subject of much interest, a brief notice of the discovery of cellulose and starch cannot but be regarded as very desirable in this Journal.

Cellulose was first found in the tunics of the Ascidians by Schmidt* in 1845. This discovery was fully confirmed by the researches of Kölliker and Löwig,† of Schacht,‡ of Huxley,§ of Virchow,‖ and several other observers. The presence of cellulose in certain animal organisms we regard, therefore, as perfectly established. As to that of starch, however, much doubt has been entertained by many observers, which will be apparent as we proceed with our notice of that substance. Gottlieb first discovered *paramylon*, a substance isomeric with starch, in *Euglena viridis*, an organism commonly regarded by German naturalists as an animal, but by others again (and, as we believe, correctly so,) as a plant. This discovery, therefore, of Gottlieb, proves nothing of a satisfactory nature as to the presence of starch, and bodies isomeric with that substance, in animal tissues. In 1853 Virchow published a communication "On a Substance presenting the Chemical Reaction of Cellulose, found in the Brain and Spinal Cord of Man."¶ Mr. Busk, in repeating these observations, was led to conclude that the corpuscles thus described by Virchow were starch and not cellulose,** as they possessed all the structural, chemical, and optical properties of the starch of plants, as is evident from the following observations of Busk:—"They were of all sizes, from less than a blood-disc up to 1-500th inch or more—generally more or less ovate, but many irregular in outline, and apparently flattened, as all the larger kinds of starch I believe are. Many of the larger ones showed the appearance, which in starch (according to Busk) has been erroneously described as indicative of a laminated structure; whilst in others this appearance, under any mode of illumination, certainly did not exist. The point that would correspond with the so-called nucleus of a starch-grain, was unlike that of most kinds of starch, central, and consequently the laminated marking was concentric to the grain, which is rarely the case in the starch of plants." Mr. Busk then further proceeds to show that the structure of these corpuscles was identical with that of vegetable starch, and then passes on to indicate the identity of their chemical composition thus:—"Simple watery solution of iodine coloured them deep blue, which ultimately became perfectly black and opaque. They were soluble after swelling and expanding in strong sulphuric acid and by heat; and, moreover, they acted upon polarized light in the same way as starch does. Some of the smaller grains exhibited a distinct and sharply defined black cross, of which the lines crossed at angles of 45° in the middle of the grain; but in the majority there was only a single dark line in the long diameter of the grain, and which always seemed to correspond with an irregular fissure or hilus, as it might be termed, in the same direction, which was presented in a great many of the grains, and

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* *Zur Vergleichenden Anat. d. Wirbellos*, p. 61.
† *Annal. de Sci. Nat.*, 1846, p. 193.
‡ *Mull. Archiv.*, 1851, p. 176.
§ *Quart. Journ. Micros. Sci.*, vol. i., p. 22.
‖ Virchow's *Archiv.*, B. vi., H. i., p. 135; and *Quart. Journ. Mic. Sci.*, vol. ii., p. 101, and vol. iii., p. 284.
¶ Virchow's *Archiv.*, B. vi., H. i., p 135; and *Quart. Journ. Mic. Sci.*, vol. ii., p. 101.
** *Quart. Journ. Mic. Sci.*, vol. ii., p. 106.

seemed to be the indication of a partial inrolling of them, as in the starch of the horse-chesnut. This longitudinal fissure was not unfrequently crossed by a shorter one at right angles. When the covering glass was closely pressed, the grains were easily crushed, breaking up in radiating cracks around the margin; and sometimes, when thus compressed, a concentric annulation would become evident, which was before inapparent." Busk also states that in several instances he saw amylaceous particles (coloured blue by iodine), contained in cells which they only partially occupied. Similar corpuscles were afterwards noticed by Virchow in diseased human spleens,* and in other parts of the human body. Like bodies were also afterwards observed by Donders, Rokitansky, Kölliker, and others. Mr. Stratford of Toronto also published a paper† "Upon the Presence of Starch in the Blood of an Epileptic Patient;" and in August, 1855, Mr. Thomas Albert Carter, now Dr. Carter, sent a communication to the *Edinburgh Medical Journal*,‡ "On the extensive Diffusion and frequency of Starch Corpuscles in the Tissues of the Human Body," in which he indicated the presence of starch in the liver, kidneys, spleen, pancreas, cerebrum, and some other organs and parts of the human body, as also in the like organs of the sheep and ox; and he concluded "that man, in common with some of the lower animals, must be regarded as a starch secreting organism." Dr. Carter subsequently published an inaugural dissertation, entitled "Starch as a Constituent of the Animal Body; together with some Observations on the Formation of Fat in Animals," which was delivered to the Medical Faculty of the University of Edinburgh in April, 1856; and as his conclusions were still strongly doubted, he again published a paper in the *Edinburgh Medical Journal*§ on the same subject, in which he brings forward strong evidence of the almost universal occurrence of certain corpuscles in the tissues of the animal organism, and endeavours to show that such corpuscles were starch, and not cellulose, as had been believed by Virchow and others. Dr. Carter then lays down in the form of propositions the principal conclusions which he had arrived at pertaining to the physiological relations of animal starch. They are:—

"1st. That the presence of starch in the animal body is necessary for the well-being, if not for the preservation of the lives, of individuals belonging to the principal groups of animals;—as shown by its constant occurrence in well-marked members of those groups.

"2nd. That the corpuscles undergo processes of development, growth, and decay: as proved by their variable dimensions, the diverse conditions of their outer wall, and the different appearances of their contents.

"3rd. That its function is not local, but general; as indicated by its tolerably equal dissemination throughout nearly the whole of the textures of the body.

"4th. That some of the starch found within the organism in its healthy state is apparently functionless and excrementitious; as shown by its presence in the urinary excretion, and in the mucus of the bronchial tubes, &c."‖

The subject was afterwards investigated by several physiologists, but our space will not allow of our referring to them in detail. The following notice, however, from the *Medical Times* of June 4, 1859, under the head of "Microscope and its Revelations," is much to the point, and will be sufficient for our purpose:—

"Five years ago Virchow pointed out, for the first time, the existence in certain of the human organs of abnormal products, analogous in their chemical qualities to cellulose and starch, and sometimes pretty closely resembling starch granules in

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* *Comptes Rendus*, No. 23, Dec. 5, 1853.
† *Quart. Journ. of Microscopical Science*, for January, 1854.
‡ *Edin. Med. Jour.*, vol. i., p. 130.
§ *Edin. Med. Journ.*, vol. iii., p. 78.
‖ *Edin. Med. Journ.*, vol. iii., p. 803.

form. Lately, Dr. Carter, in the *Edinburgh Monthly Journal*, announces that he finds starch granules in almost all the organs of man and the lower animals in their normal state—a proposition which seems supported by M. Luys, who has published a work upon the incessant production of starch granules on the surface of the skin. This startling and singular assertion has received a curious explanation from M. Robin, who gives a very simple account of the matter. Examining the epithelial glycogenic papillæ of the amnion, recently pointed out by M. Bernard, and endeavouring, by squeezing, to extract their contents, he found in the preparation a considerable number of starch granules. He at first imagined that this was one of the facts announced by Dr. Carter, but on closer investigation he found that the granules only existed on the surface, never within the tissues examined ; and that, in fact, the granules were always deposited from the fingers of the operator. However much the hands were washed, still starch granules adhere to them, and are deposited from them on a wet surface. M. Robin examined most carefully these sections of the skin, and never found the granules within its structure; they are deposited on the cutaneous surface from the surrounding media, dust in the air, linen, bread, &c. They are most abundant on those parts of the body—the hands and face—which are exposed. M. Robin, finding that no degree of washing of his hands sufficed to remove these granules, washed one of them in a solution of potash, strong enough to dissolve the granules, and then at once covered it with a glove. Eight hours afterwards, upon careful examination of it, he could find no granule upon the surface washed with the potash. On the other hand, however, they were present in abundance. It is almost impossible, adds M. Robin, to make a microscopic preparation without finding these granules in it ; they are therefore to be classed like filaments of cotton, &c., as mere accidental ingredients. There can be no doubt that Dr. Carter's observations refer to granules of vegetable starch ; his description precisely corresponds with that of those granules. [The low specific gravity of these granules, their remarkable resistance to ordinary causes of destruction, and their presence in the greatest part of vegetables around us, sufficiently explain the abundant presence of these granules everywhere. A few weeks ago we related some curious observations in reference to their presence in all kinds of dust—'the dust of ages,' and even in the bodies of mummies; at all times and everywhere they appear to be floating in the dust of air.]"

From the above experiments of M. Robin, and from some experiments we have since made, we think that it may be concluded that Dr. Carter is in error when he states that starch is almost universally distributed in the animal organism, while at the same time we think that some of his observations, as well as those of other observers, have been made with so much care that we cannot but believe that starch must be produced in certain cases at least in the higher animals. But whatever opinions we may entertain as to the presence of starch in the higher animals, we entertain no doubt that starch granules may be found in the cells of certain organisms which are commonly regarded as belonging to the animal kingdom. As our paper has already exceeded our proposed limits, we must content ourselves with the following additional notice of the presence of starch in the animal organization related by Mr. H. J. Carter, F.R.S., in the *Annals of Natural History*, for May, 1859. (See Paper " On the Identity in Structure and Composition of the so-called Seed-like body of *Spongilla* with the Winter-egg of the *Bryozoa;* and the presence of Starch Granules in each.") He describes the starch granules thus :—

"The granules resemble those of wheat, being subelliptical, compressed, thin, and marked with concentric circular lines; they vary in number and size, being frequently much larger than the spherical cells in which they are originally formed, and from this passing down to immeasurable minuteness, and occasionally into amorphous starch. Sometimes a large starch grain may be seen still within the spherical cell in which it was formed, when the latter much exceeds the average size of these cells; but on other occasions the large grain is replaced by a great number of minute ones, as indicated by the application of iodine, and lastly, as just stated, by amorphous starch."

NOTE ON THE TREE UPON WHICH THE INSECT PRODUCING THE WHITE WAX OF CHINA FEEDS.

In the April number of the *Pharmaceutical Journal* for 1853,* there appeared a paper by Mr. Daniel Hanbury "On the Insect White-Wax of China," in which the History, Production, Commerce, Properties, and Uses of that substance were fully and ably considered. A question of importance that remained respecting it, was the nature of the tree or trees, upon which the insect producing it (*Coccus Pe-la* Westwood) fed. Mr. Hanbury writes as follows:— "Respecting the tree or trees upon which the wax-insect feeds, it is evident that our information is as yet extremely defective. Mr. Fortune entertains great doubts whether the insect really feeds as reputed on any species of *Rhus*, *Ligustrum*, or *Hibiscus*. When in China, he obtained from the province of Sze-tchuen, through some Catholic missionaries, a living plant which he was assured was that on which the wax-insect is found. This plant, which is now in England, is a deciduous woody-stemmed shrub of about 1½ feet high. As it has not yet flowered, neither the genus nor even the natural order can with certainty be determined; but judging from its leaves, the plant has much similarity, as suggested by Mr. Fortune, to some species of ash (*Fraxinus*)."

This question has now been set at rest; for specimens of the plant in flower and fruit having been received from Shanghae, it has been ascertained to be the *Fraxinus chinensis* of Roxburgh.

NOTE ON JAPAN WAX.

For some years past occasional importations of a kind of wax have taken place indirectly from Japan, by way of China and Singapore. This wax was alluded to by Mr. Daniel Hanbury in a note to a paper published by him in the *Pharmaceutical Journal* "On the Insect White Wax of China."† Mr. Hanbury describes it as follows:—

"My specimens consist of a white wax, of somewhat rancid odour, in circular cakes of from four to four and a half inches in diameter, nearly one inch thick, flat on one side, and rounded off on the other, as if cast in a small saucer. They are sparingly covered with a white powder, and in a sample presented to me by Messrs. T. Merry and Son, present here and there traces of a sparkling crystalline efflorescence."

The fusing points of two samples which Mr. Hanbury examined were found to be respectively 125°, 6°, and 131° Fahr. Since the ports of Japan have been open directly to British traders, the importation of this wax has largely increased, and we now receive it no longer principally in cakes, as described above, but in large square blocks or cases, each of which averages in weight about 133 lbs. Some of it is reported to have been sold at 70*s.* per cwt.; but the present price is too high to allow of the greater portion being disposed of.

This wax is said to be obtained from the fruits of the *Rhus succedaneum* of Linn.,‡ as a substance answering in general characters to it is stated by Kæmpfer and Thunberg to be obtained from that plant. Thunberg§ says:— "Oleum hujus seminum contusorum et post coctionem adhuc calentium prelo submissorum expressum, candelis conficiendis inservit et sebi consistentiam acquirit." Kæmpfer‖ makes a similar statement, and has a figure of the plant. Good specimens of the fruit of the plant said to yield Japan Wax have been imported with the wax itself. Upon examination this fruit appears exactly to resemble that of *Rhus succedaneum*, *L.*, as given above, by Kæmpfer. Nevertheless, we are informed by Mr. Sowerby that upon sowing some of these fruits

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* Vol. xii., p. 476.
† *Pharm. Journ.*, vol. xii., p. 476, note A.
‡ *Linn. Syst. Nat.*, t. ii., p. 242.
§ *Flora Japonica*, p. 122.
‖ *Kæmp. Amœnitates exoticæ*, p. 794.

at the Royal Botanic Gardens, Regent's Park, the seedling plants which were obtained had serrated leaflets, whereas the *Rhus succedaneum*, as described and figured by Kæmpfer as above, are said to be *entire*. Roxburgh* also says they are entire. Japan wax has also been described by Martiny as follows:—

"*Cera Japonica*, *Japanese Wax*, *Tree-Wax*, incorrectly *Cera Americana*, *American Wax*.—Under these names there has of late times appeared in commerce a species of wax, the origin of which is at present unknown. It has been supposed by Landerer not to be of vegetable, but of animal origin, and, possibly identical with stearine (*Fettwachs*) or adipocire (*Leichenseife*).

"To determine this, H. Müller instituted some experiments, the result of which was that the wax in question was found to be identical neither with stearine nor with beeswax; it is softer at the same temperature, and fuses at + 45° C. (= 113° F.); moreover, it solidifies upon slow cooling, under similar circumstances, perceptibly more slowly; it has not the odour and tastelessness of common wax, but, on the contrary, always smells and tastes like rancid tallow; it is far more soluble in alcohol than beeswax; it is saponified by caustic alkalies, and a taper made with it burns with as bright a light as a similar one of beeswax.

"It is supposed that Japanese Wax is derived from *Rhus succedanea*, L., a tree belonging to the Natural Order *Anacardiaceæ*, a native of Japan. Candles are made in Japan from the oil of the seeds of this tree. According to Nees von Esenbeck, the wax of *Rhus succedanea* completely resembles the Japanese Wax found in trade, and when treated with sulphuric acid its surface becomes of a reddish brown, as does that of beeswax, the acid remaining uncoloured. The seeds of another Japanese tree, *Rhus vernicifera*, D.C., also contain a tallow-like oil, which is used in the making of candles.

"Japanese Wax very much resembles white wax, but it is less white, more yellowish, and in substance is more tender and crumbling, besides which, it possesses the properties we have already enumerated. It probably contains more oxygen than beeswax."†

In the *Journal de Pharmacie*, for December, 1842, there will be found a paper by B. Sthamer, entitled, "Sur la composition de la Cire du Japan," containing much valuable information upon a kind of wax from Japan, which, from the description given by the author, would appear to be identical with that now imported. The author states that he undertook to investigate the subject at the desire of Liebig.

From the above evidence it is quite clear that a kind of wax is obtained in Japan from the *Rhus succedaneum* of Linn., but it is, at the same time, very probable that other plants may also yield a portion at least, of the present wax of commerce; moreover, this wax, in some of its characteristics, so strongly resembles beeswax, that we can scarcely believe that it is altogether of vegetable origin. Mr. P. L. Simmonds, in the *China Telegraph*, gives the following account of Japan Wax:—

"*Rhus succedanea*, the species which furnishes the Japan Wax, has long been grown in our greenhouses, having been introduced from China nearly a century ago. It might be raised, we should suppose, in the Cape and Australian colonies, in the Mauritius, and India, and would be far preferable as an oleaginous plant to the species of candle-berry myrtles from which wax is obtained. It will grow in any common soil, and may be readily increased by cuttings. We shall probably soon learn what is the ordinary mode of culture in the plantations of Japan, and whether any attention is paid to manuring, pruning, &c. The wax is of medium quality, between beeswax and the ordinary vegetable tallows, such as Bassia butter, Borneo vegetable tallows, Cocum butter, &c. Though there are shades of difference, several of these varieties of wax possess

* *Flor. Indic.*, vol. ii., p. 98.

† *Encyclopädie der Medicinisch pharmaceutischen Naturalien und Rohwaarenkunde*, Bd. i., p. 172.

the essential properties of that formed by the bee; indeed, it was formerly supposed that bees merely collected the wax already formed by the vegetable; but Huber's experiments show that the insect has the power of transmuting sugar into wax, and that it is in fact a secretion. Japan Wax is softer, more brittle, and fatty than beeswax, easily kneaded, and melts between 40° and 42° C. It contains twice as much oxygen as beeswax, and has a different composition, consisting of palmitic acid, united with oxide of glyceryle. The small parcels which formerly reached this country have been used in Price's Patent Candle Works, in substitution for wax, and for hard neutral fat, and, after conversion into the acid state, both for candles and night-lights. If the wholesale price can be reduced, this wax will find its way into extensive consumption on the Continent for various purposes."

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Composition of the Cuticle of Plants.—M. Fremy, in his memoir on the Composition of Vegetable Cells,* expressed his opinion that cellulose was capable of existing in several isomeric conditions; because the cellular membrane contained in the pith of certain trees and the tissue of champignons resists the solvent action of cuprate of ammonia, while the cellulose of roots and fruits is immediately dissolved. This view was contested by some members of the French Academy, who considered that the difference of action was due rather to a difference in the purity of the membranes, the presence of a large amount of inorganic salts, &c. M. Fremy, therefore, has continued his investigation of this subject, and has shown that two kinds of cellulose exist, which are isomeric; one occurring in cotton, in almost all cortical fibres, in the utricular tissues of fruits and roots, and which is immediately soluble in the cupric reagent; and a second, principally constituting the pith of trees, ligneous fibres, the utricular tissue of the epidermis, &c., and which is not immediately dissolved by cuprate of ammonia. The latter kind M. Fremy has named *paracellulose*. By the prolonged action of boiling water, or of a temperature of 150° C., and in other ways, this latter body may be converted into the soluble modification.

In the course of this investigation M. Fremy was induced to examine the pellicle which covers the epidermis of plants, and which was discovered by M. Bronquiart, and named the *cuticle*. This substance was obtained by removing with the hand the external membrane of the leaves of the iris, without detaching the green parenchyma. This colourless and transparent membrane consists of two parts—one external, which is the cuticle, the other internal, composed of the epidermic cells. These cells, however, consist of paracellulose, and in that state are insoluble in the cupric reagent; the membranes were therefore boiled for half an hour in dilute hydrochloric acid—which has the effect of altering the paracellulose and rendering it soluble; they were then washed with water, and treated with the cuprate of ammonia, which entirely dissolved the cellulose; the insoluble portion was washed first with water, then with hydrochloric acid, which removed the copper and ammonia, then with a dilute solution of potash to dissolve the albuminous matters and pectic acid, and lastly with alcohol and ether to remove fatty substances. The membrane was thus obtained in a state of purity; microscopical examination showed that it was entirely free from other tissues, and consisted of a continuous membrane without any appearance of organization, and which had the openings corresponding to the stomata. The cuticle of a great variety of leaves, the petals of flowers, and the epiderm of fruits, were thus obtained, varying considerably in thickness. The experiments were chiefly made upon the cuticle obtained from apples; this substance contained ten to fifteen thousandths of inorganic matter; it was insoluble in all the neutral solvents; was unaltered by dilute potash, by ammonia, cuprate of ammonia, by boiling hydrochloric acid, and by cold sulphuric and nitric acids. It possessed very great elasticity. Submitted to analysis, it gave

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* See last "Report," *Pharmaceutical Journal*, p. 115.

Carbon	73·66
Hydrogen	11·37
Oxygen	14·97

This remarkable composition, differing so much from the other vegetable tissues, places this substance by the side of the fatty bodies. In fact, the reactions of this membrane are perfectly analogous to that class of substances. Submitted to the action of heat it gives rise to true fatty acids; acted upon by boiling nitric acid, it produces all the bodies which are formed from the fats under the same circumstances,* and particularly suberic acid, which is also produced by cork; lastly, submitted to the action of concentrated and boiling potash, it loses its membranous appearance and is saponified like a true fat. The soap thus formed gives by its decomposition an acid liquid, soluble in alcohol and ether, and presenting all the characters of a fatty acid. M. Fremy therefore concludes that the epidermic cells of the plant are covered by a membrane composed of an immediate principle, which he terms *cutine*. This substance presents certain analogies to the fatty bodies; it is saponified like them, and resembles them in its elementary composition, and by the bodies which it forms under the action of heat, or nitric acid. It differs, however, by its perfect insolubility in ether and by its membranous character. M. Fremy is still engaged in the investigation of this subject.

On some Bodies Analogous to Cane-sugar.—M. Berthelot has published† the results of some new researches upon the saccharine bodies. He divides the whole class of sugars, properly so called, into two fundamental groups, of which cane-sugar and glucose are the respective types. The glucose group is characterized by fermenting directly, in contact with yeast; by being destroyed by the strong alkalies at 100° C., and also in the cold; and by reducing the potassio tartrate of copper. When dried at 100° the bodies belonging to this group are isomeric, and represented by the formula C_{12} H_{12} O_{12}. These bodies differ in their crystallization—in the amount of their rotatory power—in the modifications they undergo by heat and the acids—in the nature of their combinations with water, the bases, and common salt—in the formation of mucic acid, &c.

The bodies analogous to cane-sugar are difficultly fermentible by yeast; almost unchanged at 100° C. by the alkalies and potassio tartrate of copper, submitted to the action of weak acids they are converted into new sugars, easily and directly fermentible and belonging to the glucose group; dried at 130° C. they are isomeric, and have the formula C_{12} H_{11} O_{11}. The sugars of this class are also distinguished from each other by their crystallization, rotatory power, unequal resistance to heat, acids, and ferments, their combinations, the formation of mucic acid, &c. Between these two groups sugar of milk stands intermediate; analogous to the glucose series by the action which the alkalies and salts of copper exert upon it, it yet approaches the other sugars by its composition, C_{12} H_{11} O_{11} at 150° C., by its resistance to the action of yeast, and by its capability of being converted into a glucose directly fermentible by the weak acids.

In his present memoir M. Berthelot treats of several bodies which, according to the above classification, are analogous to cane-sugar. Some years ago he discovered one of the first examples of this new category, which he named *Mélitose*. He now describes the properties of two others, namely, *Tréhalose* and *Melézitose*.

Tréhalose.—At the last Paris Exhibition a manna was exhibited, from Turkey, which was simply labelled *Trehala*.‡ According to information received by M. Guibourt, trehala is a vegetable substance, employed in the East as food, and is constructed by an insect, the *Larimus nidificans*, at the expense of a plant of the genus Echinops. It occurs in the form of whitish, ovoid, hollow coccons, smooth inside, and with a rough crisp exterior. Treated with water, trehala swells out, and is converted into a mucilaginous mass. It contains gum, trehalose, and a particular kind of starch, much less attackable by water than that from wheat or potatoes. To obtain the trehalose, the Turkish manna, powdered, is treated with boiling alcohol. Sometimes it crystallizes out on cooling, while in other cases it is necessary to evaporate the solution to a syrupy consistence, and allow it to stand for

* Mitscherlich has already shown that the envelope of potatoes, and the cuticle of *Aloe Lingua* produce a fatty acid when treated with nitric acid; 100 parts of the skin of potatoes gave 6·2 of a fatty acid soluble in alcohol.

† *Annales des Chim. et de Ph.*

‡ *Pharm. Journ.*, vol. xviii., pp. 233 and 402.

several days. The crystals are collected, pressed, washed with cold alcohol, and also boiled with a very small quantity, in order to purify them. They are then dissolved in boiling spirit, and treated with animal charcoal. The solution, on cooling, deposits the trehalose, which may, if necessary, be again crystallized. The crystals of trehalose are rectangular octohedrons, hard and brilliant, cracking under the teeth, having a strongly saccharine taste, but less characteristic than cane-sugar. The analysis of trehalose, fused and dried at 130° C., corresponded with the formula C_{12} H_{11} O_{11}. The crystals, simply dried in the air, contain two atoms of water in addition, a portion of which is lost by prolonged exposure. If some of the crystals of trehalose be placed in the bottom of a long tube, and heated to 100°, they fuse into a vitreous, transparent liquid. If placed in a capsule, however, they may be heated up to 120°, 140°, and even 180°, without fusing ; while they lose all their water of crystallization at 97°, and become opaque. Once fused at about 120°, the mass swells up, and becomes more and more viscous, as the water evaporates, but without completely solidifying. Trehalose fused and then cooled, forms a substance similar to barley-sugar. Below 180° it undergoes no sensible alteration by heat. It can even be heated to 200° C., and yet obtained again in crystals by re-solution. These characters indicate that trehalose is more stable than cane-sugar, and the fermentible sugars hitherto known, for all these bodies maintained at 180°, or even less, are completely destroyed. Heated above 200°, trehalose itself is decomposed, loses water, and is converted into a black insoluble matter, with disengagement of a gas, and the odour of caramel. In the air it burns with a reddish flame, leaving a combustible carbon.

Trehalose is very soluble in water, insoluble in ether, almost insoluble in cold alcohol, but very soluble in boiling alcohol. It is deposited in regular crystals, during the cooling of its alcoholic solution. Its aqueous solution may be brought to a syrupy condition without crystallizing, at least for a certain time. The crystals formed by spontaneous evaporation are often larger but less regular. Trehalose possesses the power of molecular rotation. It is dextro-gyre, like the majority of the sugars. This power, for the crystallized trehalose, is equal to +199°, and for the anhydrous +220°. This amount varies a little with the temperature, but is sensibly the same when the solution is first made and twenty-four hours after. According to the preceding numbers, the rotatory power of trehalose is triple that of cane-sugar, and greater than that of any other known sugar. The manner in which this power is affected by acids is very characteristic; while cane-sugar is modified almost instantly at 100° by the dilute mineral acids, and transformed into a mixture of two glucoses, which is levo-gyre, and consequently reversed; trehalose is very tardily modified by sulphuric acid, even at 100°, and is changed into a single sugar, which is still dextro-gyre, but four times less active, and probably identical with grape-sugar. Trehalose, in contact with yeast, ferments very slowly, and in an irregular and incomplete manner. On the contrary, the glucose obtained from trehalose by sulphuric acid, ferments immediately, furnishing alcohol and carbonic acid. The alcohol so obtained presents a slight amylic odour. In these respects cane-sugar resembles to some extent trehalose. The latter, however, is a more stable body, and more difficult to ferment. The reactions of trehalose are extremely analogous to those of cane-sugar: it is unaffected by potash or baryta at 100°, it does not reduce in any marked manner the potassio-tartrate of copper, it is precipitated by the ammoniacal acetate of lead. Nitric acid converts it into oxalic acid without the formation of mucic acid. Heated to 180° with stearic, benzoic, butyric, or acetic acids, it forms a small quantity of a neutral compound, analogous to the fatty bodies. Under the influence of dilute sulphuric acid, it is converted, as before said, into a sugar, analogous, if not identical, with grape-sugar.

According to the whole of the preceding characters, trehalose constitutes a new sugar analogous to cane-sugar, but much more stable. By its relative resistance to the action of heat, of acids, and of yeast, it appears to stand intermediate between the group of sugars properly so called, and those principles which contain an excess of hydrogen, such as mannite, dulcine, and glycerine.

M. Mitscherlich recently discovered a substance in the ergot of rye, namely *mycose*, which presents the most striking resemblance to trehalose; so much so that the author is inclined to regard them as identical, notwithstanding the difference of their origin. Their composition is the same, even in the proportion of water of crystallization, and also their general reactions, those of the alkalies, the acids, ferments,

tardiness of modification by sulphuric acid, fusion at 100°, &c. Their crystalline form is also essentially the same. The temperature at which they part with their water only offers some difference, because trehalose is completely dehydrated at 100°, which is not the case with mycose. The essential difference between these bodies appears to consist in their rotatory power; that of trehalose is equal to +199°, while that of mycose, according to Mitscherlich, is +173°.

Melézitose is obtained from the manna of Briançon, which is a concrete, saccharine exudation, produced by the larch tree (*Pinus larix*, *Linn.*). This substance was once employed in Pharmacy, but is now never used, and is not to be met with in commerce. It occurs in the form of small round whitish globules, of several millimetres diameter; it is almost entirely composed of *melezitose*. To obtain this body the manna of Briançon is treated with boiling alcohol, and the solution evaporated to an extractive consistence, and allowed to stand for several weeks. The melezitose crystallizes in a syrupy mother liquor; it is pressed, washed with tepid alcohol, and crystallized from boiling alcohol. It is thus obtained in very little, short, hard, brilliant crystals, which, examined by the microscope, appear to be oblique rhombic prisms, analogous to those of cane-sugar. These crystals, viewed in the mass, appear opaque, due to a slight efflorescence; their taste is sweet, resembling glucose, and therefore much weaker than cane-sugar. Melezitose, dried at 110°, has the same composition as cane-sugar and trehalose, and corresponds to the formula C_{12} H_{11} O_{11}. At the ordinary temperature it appears to contain water of crystallization, but it is so easily lost by efflorescence that it cannot be determined with certainty. It does not exceed one equivalent. Melezitose fuses below 140° into a transparent liquid, without any sensible alteration. On cooling, this liquid condenses into a vitreous mass, like barley-sugar. At 200° it is decomposed. It is very soluble in water, insoluble in ether, almost insoluble in cold alcohol, little soluble in ordinary boiling alcohol. Absolute alcohol, added to a concentrated aqueous solution, slowly precipitates it in the crystalline form. Its aqueous solution, left to spontaneous evaporation, becomes syrupy, and remains a long time without crystallizing. Melezitose is dextro-gyre, like cane-sugar; its rotatory power is equal to +94·1°. It is modified by acids more slowly than cane-sugar, but quicker than trehalose, without reversing its rotatory power, and produces a single sugar, identical with grape-sugar. Melezitose, mixed with yeast, ferments badly, but is converted by acids into a sugar directly fermentible, identical with grape-sugar. It does not furnish mucic acid. Its general reactions are precisely the same as those of cane-sugar, which it strikingly resembles. It differs however, by its action on polarized light, and by a more marked resistance to the action of ferment.

The existence of four isomeric sugars, possessing certain general characters in common, is thus established — namely, cane-sugar, trehalose, melezitose, and melitose.

M. Berthelot has also carefully investigated the properties of four sugars obtained from other sources; these are, the sugar from the Java palm (*Saguerus Rumphii*); from the Sorghum species; from the maple; and from the carob (*Ceratonia siliqua*, or St. John's bread). These four sugars are perfectly identical with cane-sugar; they possess the same crystalline form, the same rotatory power, and the same reactions; they are all, in fact, the same body, and serve to indicate the great diffusion of this substance in the vegetable kingdom.

On the Transformation of Two immediate Principles of Invertebrate Animals into Sugar.*—M. Berthelot has succeeded in converting *Chitine* and *Tunicine*, two immediate principles contained in the skeleton of invertebrate animals, into sugar and alcohol. The organic part of the skeleton of the *Vertebrata* consists essentially of nitrogenous matter, insoluble in cold water, but soluble in the alkalies, and analogous in its characters to the albuminous substances. By the prolonged action of boiling water it yields gelatine. The organic portion of the skeleton of the *Invertebrata* on the contrary, is constituted in great part of principles quite distinct from the gelatiginous bodies; sometimes these principles resemble the horny bodies, but in other cases they present much greater resistance to the action of reagents, and offer a remarkable analogy to the essential proximate constituents of vegetable tissues. Of the latter are *chitine*, contained in the skeleton of the crustacea, the arachnida, the insecta, and several zoophytes, infusoria, &c.; and the substance

* *Annal. de Chim. et de Phy.*

principally constituting the envelope of certain tunicated molluscs, and of some infusoria. These two principles possess in common the following properties: they are insoluble in water, cold or boiling, in alcohol, acetic acid, and other solvents; they are unacted upon by potash concentrated and boiling, or by the dilute acids, and they present none of the characteristic reactions of the albuminous substances. Chitine, discovered by Odier in the skeleton of insects and the crustacea; examined first by Lassaigne, who recognized the presence of nitrogen, and by Payen, has been more particularly studied by Schmidt, and afterwards by Fremy, Lehmann, Schlossberger, &c. Chitine contains, according to the analyses of Schmidt, Lehmann, Schlossberger, and the author, a fifteenth of its weight of nitrogen. Its composition may be represented as consisting of an isomer of cellulose combined with an isomer of muscular fibrine.

The principle contained in the envelope of the Tunicata was discovered and analyzed by Schmidt. It may be obtained free from nitrogen; in this state it possesses the same composition as cellulose, $C_{12}\ H_{10}\ O_{10}$. As this principle is quite distinct from vegetable cellulose in its physical properties, its structure, and its chemical characters, the author, to avoid confusion, has given it the name of *Tunicine.*

In order to ascertain more completely the nature of the relation which apparently exists between these principles and vegetable cellulose, the author has endeavoured to effect in the former bodies the same transformation which is characteristic of the latter—namely, their conversion into a fermentible sugar.

Tunicine was prepared from the envelopes of an ascidian (*Cynthia papillata*), which were boiled for several hours with concentrated hydrochloric acid, the insoluble portion separated and washed by decantation, and then boiled with a solution of potash of 32° of the areometer ; the insoluble part was washed with water until it wa neutral, and then dried. Submitted to analysis, the results accorded with the formula $C_{12}\ H_{10}\ O_{10}$. Tunicine, in the dry state, is a white opaque substance, of almost horny consistence, without any crystalline structure, insoluble in all the solvents. In the moist state it is soft, supple, and tenacious. Its tenacity, however, without doubt, varies with the age of the individual from which it is derived. Examined under the microscope, it presents a fibrous structure like an animal tissue, and quite distinct from cellulose. Moistened successively with concentrated sulphuric acid, and a solution of iodine, it assumes a very pale bluish coloration, but more analogous to that which cholesterine acquires under the same circumstances. Fluoboric gas acts upon moist tunicine, and liquefies it without any sensible coloration.

The resistance of this substance to the action of reagents is very great, as is obvious from the manner of its preparation. Its conversion into sugar was effected by placing it in cold concentrated sulphuric acid, in which it slowly liquefied without any coloration. This solution was then poured drop by drop into 100 times its weight of boiling water; after being boiled for an hour the solution was neutralized with chalk, filtered and evaporated, when a syrupy liquid was obtained, which consisted of a mixture of sugar and some other substance, the nature of which was not determined. This liquid energetically reduced the potassio-tartrate of copper, and became deeply coloured by boiling with potash. Diluted with water and mixed with yeast, it fermented with production of carbonic acid and alcohol. These several characters establish the formation of a sugar analogous to glucose at the expense of a principle contained in the envelopes of the ascidians.

The same experiments were repeated with *chitine*, obtained from lobsters and also from cantharides. It was prepared in precisely the same manner as tunicine. It presented still greater resistance to the action of reagents than tunicine; it was, however, by the same process, converted into glucose, which was fermented and the alcohol isolated.

The presence of nitrogen in chitine has been contested; several analyses were, therefore, made upon this body, prepared in different ways, and from various sources, the result of which indicated that nitrogen is an essential constituent.

These results establish a new and more striking connexion, founded upon a definite chemical transformation, between the immediate principles contained in the envelope of the invertebrata and those which form the vegetable tissues, for they confirm the isomerism of tunicine and cellulose, and lead us to regard chitine as a combination of a non-nitrogenous principle, analogous or identical with tunicine, with a nitrogenous principle analogous to the horny matters.

The Action of Air on a Mixture of Sulphide of Calcium and Carbonate of Soda.—M. Pelouze, in the course of some experiments on the proportion of carbonate of soda present in some specimens of artificial soda ash, found that a specimen, which indicated a certain per-centage of alkali, after being heated to dull redness for a few minutes, apparently contained a smaller proportion of carbonate of soda. He therefore made some further experiments with a view of ascertaining the cause of this discrepancy. He found that in some soda ash heated to redness for an hour and then exhausted with water, the solution gave an abundant crystallization of sulphate of soda, and contained a very small quantity of carbonate of soda; the insoluble portion consisted principally of carbonate of lime. He also found that, during the calcination in the air, the soda ash increases in weight in proportion as the amount of carbonate of soda diminishes; but that, if the calcination is effected in an atmosphere deprived of oxygen, no change of any kind takes place. The results, therefore, admit of a simple explanation. The sulphide of calcium which is contained in the soda ash in the state of oxysulphide, under the influence of the heat and the air, absorbs oxygen, and becomes converted into sulphate of lime. When the calcined mass is treated with water, an exchange of acids and bases takes place, and sulphate of soda and carbonate of lime is formed.

This decomposition is of considerable importance in the analysis of soda ash. It shows the necessity of drying the samples out of contact of air. It is also of importance in the manufacture of carbonate of soda. This alteration takes place at much lower temperatures than that of a red heat, and even occurs if the sample be exposed to the air for some months.

Saccharated Lime for use in Medicine. Concentrated Lime Water.—Dr. Cleland has introduced a solution of lime in syrup for use, in preference to ordinary lime water, in medicine. He prepares it as follows:—Slake 8 oz. of quick lime, rub up with it 5 oz. of white sugar, add 1 pint of water, stir for some time, till the hard stiff masses which the sugar and lime are apt to run into, are as much as possible dissolved; then filter. The product should be perfectly clear, and of only a slightly yellowish tint. A solution made in this way will contain 18 grains of lime in every ounce, by weight, and altogether about 106 grains of solid matter to the ounce. Taken undiluted a few drops are sufficient to roughen the tongue. When diluted, the taste is at first an acrid one of lime; but this is immediately replaced by a sweet taste in the back of the mouth, admitted to be pleasant. Made as just recommended, the solution is not liable to decomposition unless it is exposed to the air. By employing a smaller proportion of water to lime, a still stronger solution may be obtained, but not with any practical advantage, as there is increased difficulty of filtration and greater tendency to decomposition. The strongest solutions are scarcely, if at all, affected by boiling, but if diluted, a copious precipitation takes place on application of heat. This, however, will not serve as a test of strength, as addition of sugar in sufficient quantity will make any solution, of whatever strength, remain clear on ebullition. This preparation may be given in doses of from 20 or 30 to 60 minims or more, in a glass of water, two or three times a day.

ON THE PREPARATION OF CARYOPHYLLINE.

BY DR. THEODOR W. C. MARTIUS.

Professor of Pharmacy and Pharmacognosy in the University of Erlangen, Hon. Mem. of the Pharmaceutical Society of Great Britain, &c.

After that Baget and Lodibert had made the discovery of caryophylline in cloves, in the year 1825, it was remarkable that Bonastre should find none of this constituent in the cloves of Cayenne.* As I have, upon two occasions, successfully employed this particular kind of cloves for the preparation of caryophylline, there appears ground for concluding either that I operated upon a greater quantity of material than did Bonastre, or that I adopted an entirely different process in order to obtain this hitherto rare substance.

In the preparation of oil of cloves, it is necessary, in order to obtain the largest produce, to subject the cloves to repeated distillation. In this process, however, one cannot avoid that through a too strong fire some of the contents of the

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* *Trommsdorff, Neues Journal*, Bd. ii. St. 1, S. 112.

still should splash over [*der Blaseninhalt überschiesst*], especially during the last distillation, when a comparatively small quantity of oil comes over. In such case, the oil is mixed to a greater or less extent with dusky, white, or brown flocks, which subside to the bottom of the vessel. If the distilled product be now placed on a filter, the watery part speedily passes through, but the oil, with its flocculent admixture, filters with extreme slowness. After several days the oil will have run through, leaving, however, both the flocculent residue and the filter strongly impregnated with it. Let the filter and its contents be now washed with cold alcohol of 33° Beck [= Sp. gr. 0.839] until the latter runs off tasteless—for which process a comparatively large quantity of alcohol is requisite. The filter should now be dried; its contents should be collected, mixed with much animal charcoal, treated with boiling alcohol (.839), and filtered hot. The clear solution upon cooling sets into a uniform white magma. This, which is caryophylline in an amorphous form, is to be transferred to a filter, allowed to drain, and then dried in the air. I have never, by this process, obtained caryophylline in the form of crystals, probably from my solutions being too much concentrated. The process is, upon the whole, simple, though costly as regards alcohol; I have applied it in the case of Bourbon and Amboyna cloves, as well as in operating upon Cayenne cloves.

The following process, however, is simpler and less expensive. It was put in practice upon some Cayenne cloves, and in fact upon a sample, 10 lbs. of which, after a fourteenth distillation, yielded only 25½ ounces of oil, while in general, from a like weight, one ought to obtain 33½ ounces.

If there be taken cloves (of any kind) which by repeated distillations with water have been as much as possible deprived of essential oil, and they be introduced with water into an alembic charged up to the neck, and a quick heat be then applied, there suddenly passes over a brown, flocculent, turbid liquid. To refer to an actual experiment, after Cayenne cloves had been distilled for the thirteenth time, and the quantity of oil obtained in the last distillation was so inconsiderable that further treatment was thought unnecessary, I rapidly subjected them four times over to the process described, thus obtaining from 38 to 40 litres of a brown distillate. The alembic was now emptied and cleansed from the exhausted materials, the brown distillate was introduced and distilled. From the first 7 litres of milky distillate that passed over, there separated 5 drachms of oil, which, however, was of weak taste, and perhaps consisted chiefly of caryophyllic acid. The distillation was continued until the solution that passed over scarcely possessed the smell or taste of cloves, and was as clear as water. On the next day, the residue remaining in the alembic having become cold, was transferred to a filter and washed with cold water until it ceased to yield any colour. When dried, this mass constituted crude caryophylline—free, however, from all trace of oil of cloves. It was now transferred, with the addition of some animal charcoal, to a proper (and for such extractions peculiarly adapted) tin vessel, treated in a water-bath with boiling alcohol (.839), and the solution filtered hot. The crude caryophylline, which had separated upon cooling, and which formed with the alcohol a sort of magma, was now transferred to a filter; the spirit running from it of a yellowish brown. The filtered liquor was again thrown upon the charcoal, raised to the boiling temperature and filtered, by which, however, but little caryophylline was separated. This, however, was placed upon a filter; the alcohol that drained from it was distilled off to a few ounces, and the residue mixed with some animal charcoal and evaporated—and then treated with fresh boiling alcohol. The caryophylline thus purified, and perfectly white, weighed, when added to that previously obtained, 1 ounce and 5 drachms.

A portion of the cloves which had been submitted for the fourteenth time to the process of distillation, and had then been dried in the air, were treated in the tin vessel with boiling alcohol, and rapidly placed on a filter. The brown solution, upon cooling, deposited some caryophylline in cloudy flocks, but its quantity was inconsiderable; and when it is requisite to prepare the substance in larger quantity, the process, just described, of driving it over with water is certainly the most to be recommended, and the cheapest.

If one had to operate upon a considerable quantity of cloves, as 50 pounds or more, it would probably be the simplest way of all, after obtaining the oil, to transfer the contents of the still while yet hot to a coarse strainer, and when drained again, to boil them. The mixed decoctions might be allowed to subside for some days in large glass bottles, the clear supernatant liquor poured off from the sediment,

and this latter then washed with cold water several times. Having been thrown upon a filter and dried, it might then be treated with alcohol and animal charcoal as already described.—*Wissenschaftliche Mittheilungen der physicalisch-medicinischen Societät zu Erlangen*, 1859, Heft. II. S. 54.

ON THE CULTURE OF BIXA ORELLANA AND THE PREPARATION OF ANNATTO.

BY TH. PECKOLT, OF CANTAGALLO.

This neat little tree, which, in the neighbourhood of Cantagallo, in Brazil, flowers in December and January, and ripens its fruits towards the latter part of April or in May, grows without attention in most of the provinces of Brazil, and might, with a little care, be made more profitable than many other vegetable products which require cultivation, more attention, and labour. For the province of Parà, the production of annatto is one of its many sources of wealth, though this dyestuff is, by some unscrupulous manufacturers, adulterated, and its price, consequently, has become depressed; Parà is the only Brazilian province where it is cultivated.

For domestic purposes it is much employed here, as well as in the United States and Europe, being used for colouring butter and cheese, and likewise for beautifying and seasoning some dishes; as a medicine it enjoys a somewhat favourable reputation in Brazil, and as a dyestuff, it is almost indispensable.

Notwithstanding the scandalous sophistications, its price in Parà is now from 10 to 12 millreis per arroba (1 millreis = 50 cts.; 1 arroba = 32 Portuguese pounds), and promises to again rise to its former height of 18 millreis, if the necessary precautions against adulterating it should be taken.

It is a matter of experience that the annatto tree grows luxuriantly in almost any kind of soil, and is, therefore, recommended for the cultivation of such land as is not well fitted for the production of alimentary articles.

The mode of growing this tree is as follows: The land is prepared at the same season and in the same manner as for cotton. The land is furrowed, and at a distance of eight or ten feet two or three seeds are planted, which must have been first soaked in water for some time. After some time, other seeds are planted, where the first ones had not germinated; after three months a weeding takes place, when the superfluous plants are likewise pulled out, not more than one being allowed in one place. Now all the necessary attention has been paid to this tree, with the exception, perhaps, of another superficial weeding, if the weeds should grow too fast.

The fruit capsules ripen after eight or ten months, and are collected when they have assumed a reddish colour and some are breaking open. The branches with the fruit (*caixos*) are detached from the tree, in consequence of which it bears more without growing high enough to render the collection of the fruit a matter of difficulty. The capsules are spread upon *esteiras* (mats) or cloths, and frequently turned; after thus drying in the sun for three or four days, they are collected into piles, and beaten or thrashed with clubs, to separate the seeds, which are cleaned from the empty capsules by *ventiladores*, or upon sieves, by shaking and blowing.

To obtain the colouring matter, the following apparatus are in use:—A machine, consisting of two upright cylinders, which by means of screws are brought together close enough to crush the seeds, which may be also accomplished by millstones; three large wooden water-tubs, one of which is separated into two parts by boards, an ordinary press, two large copper kettles, several tubs (*gamellas*), &c.

The seeds are kept overnight, under water, in one of the large tubs; the second tub is filled with pure water, to have it always convenient and to wash all the implements used. Next morning, small portions of the soaked seeds are taken out, and by two persons well rubbed between their hands and against the sides of the gamellas, a little of the water from the first tub being added once in a while. After the water has become saturated with the colouring matter, it is poured upon a sieve in one of the divisions of the third tub, and then strained into the second division by means of an *urupema* (fine sieve). The seeds are well rubbed upon the first sieve, and then slightly bruised between the cylinders, after which they are rubbed again in the gamella with some water, expressed with the hands, and strained through the first and afterwards through the second sieve. The strained liquids from the first and second washings are mixed, and, in a large gamella, allowed to settle, which requires about eight hours; the sediment is called *tapiocca de urucù*. The seeds are then

again treated in the same way a second and third time between the cylinders, in the gamella and the sieve, and are lastly expressed, to gain all the liquid. When passing through between the cylinders, the seeds are the third time completely mashed, and the liquids of the second and third washings are immediately introduced in a kettle to evaporate. From the sediment, tapiocca de urucù, the supernatant liquor is decanted and set aside to gain the balance of the colouring matter, which may be still suspended. When the evaporating liquid assumes the consistency of syrup, the tapiocca de urucù is gradually added and the whole stirred constantly. The fire must now be slackened, and regulated with great care, and incessant stirring is essential, until the mass is of the consistence of a thick extract, when the kettle is removed from the fire and allowed to cool. The mass is then taken out in pieces with both hands and thrown into a box lined with banana and palm leaves; each time the hands are rubbed with *ageite de mammono*, impure castor oil, to keep the mass from adhering to the hands.

From the uncultivated *Bixa Orellana*, common in this neighbourhood, I have prepared annatto. From a sparingly bearing tree I collected 16 pounds of capsules, the seeds of which, by three washings, without crushing, yielded 2 pounds of a nice colour, which separated from the first washing only in about eight days. The liquor was experimentally evaporated in brass, iron, copper, and porcelain vessels to a thick extract, and completely dried in the sun. The colouring matter evaporated from the beginning in the sun was the best, the others followed in this order: 2, the product from the porcelain dish; 3, from the brass; 4, from the copper, and 5, from the iron kettle. The quality of annatto from the same port may, therefore, considerably vary, as the manufacturers use any evaporating vessel they may happen to possess. The annatto dried in the sun is easily soluble in water, forming a beautiful orange yellow solution.

Should the culture of coffee near the coast of Brazil become unprofitable, on account of the soil becoming exhausted, annatto might easily become a staple product, and then the process of its preparation would, doubtless, be much improved. *Bixa Orellana*, as stated before, will grow in almost every soil, with less than half the care and labour to be bestowed on the often failing coffee tree. But then the question would arise, would the consumption increase with an increased supply of annatto ?—*Archiv der Pharm.*, 1859, March, 291—297; and *Amer. Jour. of Pharm.* J. M. M.

VERATRUM VIRIDE.—AMERICAN HELLEBORE.

The rhizome of the *Veratrum viride*, known under the various names of American Hellebore, Swamp Hellebore, Indian Poke, and Itch Weed, has been recently much employed in the United States as an arterial sedative in inflammatory affections. This substance was first made known as a medicinal agent by Dr. Charles Osgood, in a communication published by him in the *American Journal of the Medical Sciences* for August, 1835. Its reputation is said to be now fully established as a sedative to the nervous system and circulation, and is therefore well worthy of a further trial in this country. In its local action it resembles that of white hellebore rhizome, producing, like it, irritation, rubefaction, and even in some instances vesication. When much diluted with starch or some other mild powder, it also acts like white hellebore as an errhine and sternutatory. In the United States, however, it is principally employed as an internal remedy. From the well known drastic properties of *Veratrum album*, we should have expected a similar action with this medicine, but it is stated that all who have employed it agree, that "it seldom or ever purges."

Its properties are thus described by Dr. Wood (Wood's *Therapeutics and Pharmacology*, vol. ii., page 152): "The body of the root or rhizome is fleshy, somewhat more than an inch long by an inch in thickness, coated with membranous coverings above, and thickly invested beneath with numerous whitish or yellowish fibres or rootlets. In the recent state it has a disagreeable odour, which is lost by drying. Its taste is bitter, with an unpleasant acrimony spreading through the mouth and fauces, and very durable. It imparts its sensible properties to water and alcohol; but its virtues are impaired by heat, and appear to be destroyed by long boiling." It is supposed to owe its activity essentially to the presence of *an alkaloid identical with veratria*, but a further chemical investigation of this substance is desirable. The rhizome ought to be collected for use in the autumn, and should not be kept

more than a year, as its properties are much deteriorated by long keeping. The best preparation is the tincture, which is recommended to be made by digesting, for fourteen days, eight ounces of the dried rhizome in sixteen fluid ounces of rectified spirit. The dose of this tincture is six or eight drops, repeated every three or four hours, and increased if necessary.

ON THE PRESENCE OF ARSENIC IN SOME ARTIFICIAL MANURES, AND ITS ABSORPTION BY PLANTS GROWN WITH SUCH MANURES.

BY EDMUND WILLIAM DAVY, A.B., M.B., M.R.I.A.,
Professor of Agriculture and Agricultural Chemistry to the Royal Dublin Society.

It is well known to Chemists that sulphuric acid or oil of vitriol, as it is met with in commerce, almost always contains variable proportions of arsenic; but it appears to me that this fact has been overlooked by the public, and that they are not aware to what extent this highly poisonous substance occurs in general in commercial sulphuric acid, and thus becomes the means by which arsenic enters the different substances in whose preparation that acid is employed.

My attention was first called to this subject by the difficulty I experienced in procuring any commercial sulphuric acid which did not contain a comparatively large proportion of arsenic, rendering it quite unfit and dangerous to be used for many purposes of experimental illustration. This arises from the fact, that the vitriol manufacturer has found that it is far more economical for him to make sulphuric acid from iron pyrites (a compound of sulphur and iron), which he can obtain for about twenty-five shillings a ton, than from native sulphur, for which he is obliged to pay about seven pounds for the same quantity. This ore of iron contains almost invariably more or less arsenic, which passes into the sulphuric acid manufactured from pyrites; whereas, the native sulphur containing little or no arsenic, the sulphuric acid made from it is not so liable to be contaminated with that poisonous substance. Pyritic sulphuric acid, on account of its being much cheaper, seems in a great measure (at least in Dublin) to have taken the place of that manufactured from native sulphur, and hence the occurrence latterly of so much arsenical sulphuric acid in commerce, and the presence of arsenic in so many substances in the preparation of which that acid is directly or indirectly employed.

The vitriol and manure manufacturers have been in the habit of making an inferior kind of pyritic sulphuric acid, which, owing to its dark colour, is termed brown sulphuric acid: this contains a comparatively large proportion of arsenic, and is chiefly used in making superphosphate and other artificial manures; and the manufacturer appears to think that the acid which is too impure to be used in the arts, is good enough for making manures and for other agricultural purposes. This, however, from the experiments I shall presently refer to, appears to be a great mistake.

Knowing that sulphuric acid containing arsenic was so largely employed in making superphosphate and other artificial manures, and that they therefore must contain variable quantities of that substance, I have for some time thought that it was not improbable that plants grown with such manures might imbibe or take up from the soil where those substances had been employed, a certain quantity of arsenic, and in this way be rendered more or less unwholesome as articles of food.

As a preliminary experiment to ascertain if plants had the power of taking up arsenic when it was presented to their roots in the soil, I transplanted into a flower-pot in June, 1857, three small plants of peas, and when they had recovered the transplanting, I commenced watering them every second or third day with a saturated aqueous solution of arsenious acid; and this treatment was continued for more than a week without its appearing to exercise any immediate injurious effects on the plants. At this time, however, I was obliged to leave home for some months, so that I was unable to continue longer the watering with the arsenical solution, or to observe further its effects on those plants. On my return I found that they had grown to about their full size, had flowered, and produced seed, showing that arsenic, though so very destructive a substance to animal life, had not apparently exercised any decided injurious effects on those plants.

Having collected the stalks, leaves, and pods of the peas, I carefully kept them for examination, to ascertain if those plants under the treatment they had been sub-

jected to had taken up any arsenic. Professional business, however, of one kind or another prevented at the time my pursuing the subject any further, and I did not resume the inquiry till recently, when, being engaged in the detection of arsenic in a case of suspected poisoning, my attention was again called to this subject.

In the case I allude to, the quantity of arsenic present in the stomach and its contents was very minute, and I had recourse to several methods for the detection of that metal before I could affirm positively as to the existence of arsenic; and I found that by employing conjointly Reinsch's and Marsh's methods, by far the most satisfactory results were obtained.

These methods are well known. The first consists in boiling the suspected substance along with diluted hydrochloric acid, together with some pieces of metallic copper, when, if arsenic is present, it will be deposited in the metallic state on the surface of the copper, giving it a peculiar steel-grey appearance; and on heating the copper after being washed and dried, the arsenic can be volatilized as arsenious acid, and identified by its appropriate tests. The second method consists in bringing the suspected substance, in a state of solution, in contact with a mixture of zinc and diluted sulphuric acid contained in a suitable apparatus, when the arsenic, if present, will combine with the hydrogen being generated, and will form arseniuretted hydrogen, a gaseous compound which is characterized by its producing a stain of metallic arsenic when any cool surface is held over a small jet of the gas whilst burning. On trying by these methods the stalks and leaves of the pea-plants which I had watered with arsenious acid, I found that arsenic could be readily detected in them, and was present even in the seeds, showing clearly that arsenic had been freely taken up by those plants, and that every portion of them appeared to have imbibed the poison.

This experiment having shown me that arsenic might be taken up in considerable quantity by plants without its destroying their vitality, or appearing even to interfere with their proper functions, I proceeded to ascertain if the arsenic, as it existed in different artificial manures (such as the superphosphate), would in like manner be taken up by plants growing where those manures had been applied. To determine this, I transplanted, last April, a small cabbage-plant into a flower-pot in which I had previously put a mixture of one part of superphosphate to four parts of garden mould. The cabbage after a short time appeared to recover the transplanting, and when it had been growing in the mixture for three weeks, I cut off the top of the plant, which looked perfectly green and healthy. On examining it for arsenic, I obtained the most distinct indications of the presence of that substance, though only a very small amount of cabbage, viz., 113 grains, were used in the experiment. This result was therefore perfectly conclusive as to the power possessed by some plants, at least, of taking up arsenic from manures containing that substance. As in this experiment I was aware that I had placed the plant in a most favourable condition for absorbing the poison, and that a larger proportion of superphosphate had been employed than was used in practice, my last experiments were to ascertain if the presence of arsenic could be detected in our crops grown with superphosphate in the ordinary way.

I procured for this purpose some Swedish turnips which had been grown with superphosphate, and having most carefully washed each turnip to remove every particle of adhering clay, I cut up in small pieces 2 lbs. weight of one of the turnips, and boiled them in a large glass flask for about three hours with 36 fluid ounces of distilled water, to which I had added 3 ounces of hydrochloric acid (spec. grav. 1.14), placing in the mixture 100 grains of perfectly clean and bright turnings of metallic copper. After removing the copper turnings and washing them well with water to separate the vegetable matter, and then boiling them for a few moments in a mixture of spirit and ether to remove any fatty matter which might have been deposited on the metallic copper, and finally, after the spirit and ether had been poured off, washing well with distilled water, the copper was found to have acquired the characteristic steel-grey appearance produced by the presence of arsenic under such circumstances.

The copper turnings were then carefully dried, and afterwards heated strongly in a glass tube closed at one end, when a very perceptible white sublimate was produced, which, on being dissolved in hot distilled water, and this solution added to a Marsh's apparatus in operation (the hydrogen flame, which before the addition of the solution did not give the slightest indication of a metallic stain on a cool piece of white porcelain being placed over it), produced immediately the characteristic stains

of metallic arsenic in a most striking manner, proving beyond all doubt that the matter deposited on the copper was metallic arsenic, and the sublimate arsenious acid, formed during the heating of the metal.

This experiment was repeated with the same results, using $2\frac{1}{2}$ lbs. weight of turnip taken from another of the turnips, it being previously peeled. I may observe that in these, as well as in the foregoing experiments, I was most careful that no source of fallacy might arise from the arsenic being derived from the reagents employed, which were previously ascertained to be free from arsenic; and to avoid all possibility of error, comparative experiments with the reagents alone were made in almost every step of the different investigations.

The turnips I experimented on were grown by Mr. John Rathbone, Dunsinea, Co. Dublin, and I was informed that six hundred-weight of superphosphate had been used to the Irish acre, the superphosphate being previously mixed with peat and clay, in the proportion of one part of superphosphate to three parts of the mixture of peat and clay.

These experiments appear to me to be perfectly conclusive as to the power possessed, by some plants at least, of taking up arsenic when it is introduced into the soil by artificial manures which contain it, even when they are employed in the usual way and proportions by agriculturists, and how objectionable it is to use any materials in the preparation of those manures which will introduce so destructive and dangerous a substance as arsenic into the soil.

I thought it would be desirable to ascertain the proportion of arsenic present in the brown sulphuric acid used by one of our Dublin manufacturers for the purpose of making superphosphate and other manures. In 12 fluid ounces of the acid, by the usual methods of determining the quantity of arsenic in such cases, I obtained an amount of metallic arsenic equivalent to about 12 grains of arsenious acid, or 1 grain to each fluid ounce; and the ounce of acid weighing about 800 grains, the arsenious acid would be $\frac{1}{800}$th part of the weight of the acid, which would be equivalent to about 2.8 lbs., or nearly 3 lbs. weight in the ton of sulphuric acid. But it is probable that the generality of brown sulphuric acid employed contains much more arsenic than this sample I examined, its specific gravity being only about 1.780, whereas the usual strength of the acid is 1.845. Dr. Owen Rees found 13.5 grains of arsenious acid in 12 fluid ounces of commercial sulphuric acid; and Mr. Watson, in the *London Medical Gazette*, states that the smallest quantity of arsenious acid which he detected in the same amount of commercial acid was 21.3 grains. There is therefore every reason to suppose that the acid usually employed for agricultural purposes contains a far greater quantity of arsenic than the sample I examined; and as the proportion of sulphuric acid used in making these artificial manures is very large (thus, for example, in the manufacture of superphosphates, the most valuable manure of this class, about one ton of acid is used for every two tons of bones employed), the quantity of arsenic present in such manures must be considerable.

These facts appear to me to have some important bearings, for though the quantity of arsenic which occurs in such manures is not large when compared with their other constituents, and the proportion of that substance which is thus added to the soil must be small, still plants may during their growth, as in the case of the alkaline and earthy salts, take up a considerable quantity of this substance, though its proportion in the soil may be but very small. Further, as arsenic is well known to be an accumulative poison, by the continued use of vegetables containing even a minute proportion of arsenic, that substance may collect in the system till its amount may exercise an injurious effect on the health of man and animals.

As connected with this subject, I may observe that I was informed of a curious fact—that sheep did not appear to like Mr. Rathbone's turnips which were grown with superphosphate, so well as those where the ordinary farm-yard manure had been employed, and that they could not be made to eat enough of the former turnips to fatten them properly. If this was really the case, it would appear to favour in some degree my views as to the probable unwholesomeness of vegetables grown with manures containing even in small quantities so deadly a poison as arsenic, which my experiments have shown that plants are capable of taking up from such manures.

Finally, these investigations appear to have a medico-legal bearing; for in cases of suspected poisoning by arsenic, where the evidence may chiefly depend on the detection of a small quantity of that substance in the liver and other viscera, as is

sometimes the case, my experiments would tend to throw much doubt and uncertainty on such cases, because the presence of a minute quantity of arsenic in the viscera may not be owing to its direct administration, but to its having found its way into the system through the vegetable, and, indirectly, animal food taken by the individual.

These and other important considerations connected with this subject can only be determined by a series of carefully conducted experiments, which I purpose commencing, and I hope at some future time to have the pleasure of communicating their results to this Society.—*London, Edinburgh, and Dublin Philosophical Magazine.*

ON THE USE OF ARSENICAL AND LEAD PIGMENTS IN THE COLORATION OF PAPER-HANGINGS, AND OTHER ARTICLES OF FURNITURE, DRESS, AND ORNAMENT.

BY DR. HASSALL.

The subject of green paper-hangings is one of considerable importance, both in a sanitary and manufacturing point of view ; and although much has been said and written, clear and correct notions regarding it are by no means generally entertained. Some writers have treated of green papers as though the colouring matter employed always consisted of arsenite of copper, whereas the fact is, as I have already pointed out to some extent in a former communication, that in a very large proportion of the green papers in use the colour consists of a mixture of chromate of lead and Prussian blue; this mixture is nearly always employed in the case of the dark green flock papers. Now, chromate of lead is as poisonous a substance as arsenite of copper; and if the papers prepared with the one pigment are rightly condemned, so ought those to be that are coloured with the other. Further, these same pigments are almost universally employed in the dyeing of green carpets, curtains, table and chair covers, silks, muslins, and a variety of other articles of furniture, dress, and ornament ; and if the papers coloured with them are to be condemned, so in general should the articles above enumerated, as well as many others ; for the objections urged against the green papers, apply for the most part equally to these.

In the room in which I am now writing there is a green Turkey carpet, a green velvet sofa, several green morocco chairs, and three green table covers. Now, if the views of those who have so strongly cautioned the public against the use of green papers be correct, and if they are really injurious, in the first place, I ought to be very ill, suffering from some of the effects of either lead or arsenical poisoning; and secondly, I ought (which would be a serious sacrifice) to get rid forthwith of the greater part of the furniture contained in the room which I habitually occupy.

Again, since nearly all *yellow* worsted and cotton goods are dyed with chromate of lead, these ought likewise to be discarded.

It thus becomes evident that the subject possesses extensive bearings, sanitary and commercial; and it is therefore of extreme importance that the public, on the one hand, should know whether these pigments are injurious, and, on the other, that the manufacturer should likewise be thoroughly well informed on this point.

I will now make a few remarks, which will serve to show whether, and under what circumstances, these green papers are injurious, and these remarks will apply equally to the papers coloured with either the arsenical or lead pigment.

All green papers may be divided into the unsized, sized, and flock. In the first, the colouring matter is spread over the surface of the paper, and is not secured by a layer of varnish or size ; in the second, the attachment of the pigment is ensured by this coating; while the flock papers are thus made—the flock consists of a layer of dyed wool, the colouring matter being enclosed in the hairs of the wool forming the flock.

Now, danger to health from the use of green papers can only arise in two ways, either by the volatilization of the poisonous pigments contained in them, or by their mechanical detachment and dispersion through the air of the room, when they fall on the eyes, or become inhaled. No apprehension need be entertained as to the first-named cause, for chromate of lead and arsenite of copper are not volatilized at ordinary temperatures. There remains, then, for consideration only the danger arising from the detachment of the poisons. It is obvious that this is greatest in the case of the unsized, and least in the flock papers—those, in fact, the use of which has of late been so strongly denounced—least in those, because the colouring matters

are enclosed in the hairs of the wool, and for the further reason that these hairs are so strong and elastic that they are not easily broken and detached. In fact, these flock papers resemble precisely woollen and cotton goods dyed green or yellow; and if their use is to be condemned, then, as I have before remarked, so ought that of most other green and yellow articles of wearing apparel and furniture—a somewhat serious conclusion at which to arrive.

These facts are sufficient to show that the danger arising from the use of green paper-hangings is not very great, and that it is almost confined to the unsized or unglazed papers ; they at the same time prove how desirable it is that the use of arsenite of copper and chromate of lead as pigmentary substances should, as far as possible, be dispensed with, and this might be readily done in most cases by the substitution of other and unobjectionable colours.

In my Reports on the Adulteration of Food, I showed that chromate of lead and arsenite of copper were frequently employed to colour sugar confectionary, as well as other articles. Such a practice is fraught with danger, and cannot be too strongly denounced.

I am induced to make these remarks, because I believe, first, that greater alarm than is needful is entertained by the public as to the use of these green papers; and second, that the interests of manufacturers are greatly prejudiced thereby. While it is the duty of the sanitarian to guard with jealous eye the public health, he should be most careful that in doing so he does not unnecessarily interfere with trade and manufactures.—*Lancet.*

ON PHOSPHORESCENCE, FLUORESCENCE, &c.

BY PROFESSOR FARADAY, D.C.L., F.R.S.

The agent understood by the word "light," presents phenomena so varied in kind, and is excited to sensible action by such different causes, acting apparently by methods differing greatly in their physical nature, that it excites the hopes of the philosopher much in relation to the connexion which exists between all the physical forces, and the expectation that that connexion may be greatly developed by its means. This consideration, with the great advance in the experimental part of the subject which has recently been made by E. Becquerel, were the determining causes of the production of this subject before the members of the Royal Institution on the present occasion.

The well known effect of light in radiating from a centre, and rendering bodies visible which are not so of themselves, as long as the emission of rays was continual —the general nature of the undulatory view, and the fact that the mathematical theory of these assumed undulations was the same with that of the undulation of sound, and of any undulations occurring in elastic bodies, were referred to as a starting position. Limited to this effect of light, it was observed that the illuminated body was luminous only whilst receiving the rays or undulations.

But superadded occasionally to this effect is one known as *phosphorescence*, which is especially evident when the sun is employed as the source of light. Thus, if a calcined oyster-shell, a piece of white paper, or even the hand, be exposed to the sun's rays and then instantly placed before the eyes in a perfectly dark room, they are seen to be visible *after* the light has ceased to fall on them. There is a further philosophical difference, which may be thus stated : if a piece of white oyster-shell be placed in the spectrum rays issuing from a prism, the parts will, as to illumination, appear red, or green, or blue, as they come under the red, green, or blue rays; whereas if the phosphorescent effect be observed, *i.e.* that effect remaining after the illuminating rays are gone, the light will either be white, or of a tint not depending upon the colour of the ray producing it, but upon the nature of the substance itself, and the same for all the rays.

The ray which comes to the eye in an ordinary case of visibility, may be considered as that which, emanating from the luminous body, has impinged upon the substance seen, and has been deflected into a new course, namely, towards the eye. It may be considered as the same ray, both before and after it has met with the visible body. But the light of phosphorescence cannot be so considered, inasmuch as *time* is introduced ; for the body is visible for a time sensibly after it has been illuminated, which time in some cases rises up to minutes, and perhaps hours.

This condition connects these phosphorescent bodies with those which phosphoresce by heat, as apatite and fluor-spar; for when these are made to glow intensely by a heat far below redness, it is evident that they have acquired a state which has enabled them for a time to become original sources of light, just as the other phosphorescent bodies have by exposure to light acquired a like state. And then again there is this further fact, that as the fluor-spar which has been heated, does not phosphoresce a second time when reheated, still it may be restored to its first state by passing the repeated discharge of the electric spark over it, as Pearsall has shown.

Then follows on (in the addition of effect to effect) the phenomena of *fluorescence*, and the fine contributions to our knowledge of this part of light by Stokes. If a fluorescent body, as uranium glass, or a solution of sulphate of quinine, or decoction of horse-chesnut bark are exposed to diffuse daylight, they are illuminated, not merely abundantly but peculiarly, for they appear to have a glow of their own; and this glow does not extend to all parts of the bodies, but is limited to the parts where the rays first enter the substances. Some feeble flames, as that of hydrogen, can produce this glow to a considerable degree. If a deep blue glass be held between the body and the rays of the sun, or of the electric lamp, it seems even to increase the effect; not that it does so in reality, but that it stops very many of the luminous rays, yet lets the rays producing this effect pass through. By using the solar or electric spectrum, we learn that the most effectual rays are in most cases not the luminous ones, but are in the dark part of the spectrum; and so the fluorescence appears to be a luminous condition of the substance, produced by dark rays which are stopped or consumed in the act of rendering the fluorescent body luminous: so they produce this effect only at the first or entry surface, the passing ray, though the light goes onward, being unable to produce the effect again; and this effect exists only whilst the competent ray is falling on to the body, for it disappears the instant the fluorescent substance is taken out of the light, or the light shut off from it.

When E. Becquerel attacked this subject, he enlarged it in every direction.* First of all he prepared most powerful phosphori; these being chiefly sulphurets of the alkaline earths, strontia, baryta, lime. By treatment and selection he obtained them so that they would emit a special colour: thus, seven different tubes might contain preparations which exposed to the sun, or diffused daylight, or the electric light, should yield the seven rays of the spectrum. The light emitted generally possessed a lower degree of refrangibility than the ray causing the phosphorescence; but in some instances he was able to raise the refrangible character of the ray emitted to that of the exciting ray. By taking a given preparation, and raising it to different temperatures, he caused it to give out different coloured rays by the single action of one common ray; this variation in power returning to a common degree as the temperatures of the phosphori became the same in all. He showed that *time* was occupied in the elevation of the phosphorescent state by the ray; and also that time was concerned in various degrees during the emission of the phosphorescent ray: that this time, which in many cases was long, might be affected, being shortened by the action of heat, and then the brilliancy of the phosphorescence for the shortened time was increased. He showed the special relation of the different phosphori to the different rays of the spectrum, pointing out where the maximum effect occurred; also that there were the equivalents of dark bands, *i.e.* bands in the spectrum, where little or no phosphorescence was produced.

These phosphori were many of them highly fluorescent. Thus, if one of them was exposed to the strong voltaic light, and then placed in the dark, it was seen to be brilliantly luminous, gradually sinking in brightness, and ultimately fading away altogether: but if it were held in the rays beyond the violet end of the spectrum (the more luminous rays being shut off), it was again seen to be beautifully luminous, but that state disappeared the instant it was removed from the ray. Now this is fluorescence, and the same body seemed to be both phosphorescent and fluorescent. Considering this matter, and all the circumstances regarding time, Becquerel was led to believe that these two luminous conditions differed essentially only in the *time* during which the state excited by the exposure to light continued; that a body being really phosphorescent, but whose state fell instantly, was fluorescent, giving

* *Annales de Chimie et de Physique*, 1859, tome lv., p. 1.

out its light while the exciting ray continued to fall on it, and during that time only; and that a phosphorescent was only a more sluggish body, which continued to shine after the exciting ray was withdrawn. To investigate this point he invented the *phosphoroscope;* an apparatus which may vary in its particular construction, but in which discs or other surfaces illuminated by the sun or an electric lamp, might, by revolution, be rapidly placed before the eye in a dark chamber, and so be regarded in the shortest possible space of time after their illumination. By such an apparatus Becquerel showed that all the fluorescent bodies were really phosphorescent; but that the emission of light endured only for a very short time.

An extensive series of experimental illustrations upon the foregoing points was made with fine specimens of phosphori, for which the speaker was indebted to M. Becquerel himself. The phosphoroscope employed consisted of a cylinder of wood, one inch in diameter and seven inches long, placed in the angle of a black box with the electric lamp inside, so that three-fourths of the cylinder were external, and in the dark chamber where the audience sat, and one-fourth was within the box, and in the full power of the voltaic light. By proper mechanical arrangements this cylinder could be revolved, and the part which was at one instant within, rapidly brought to the outside, and observed by the audience. As the cylinder could be made to revolve 300 times in a second, and as the twentieth part of a revolution was enough to bring a sufficient portion of the cylinder to the outside, it was evident that a phosphorescent effect which would last only the 1-3000th or even the 1-6000th of a second might be made apparent. All escape of light between the moving cylinder and the box was prevented by the use of properly attached black velvet.

The cylinder was first supplied with a surface of Becquerel's phosphori. The effect here was, that when by rotation the part illuminated was brought outside the box it was found phosphorescent. If the cylinder continued to rotate it appeared equally luminous all over, and when the rotation ceased, or the lamp was extinguished, the light gradually sank as the phosphorescence fell. Then a cylinder having a surface of quinine or æsculin was put into the apparatus. Whilst the cylinder was still it was dark outside; but when revolving with moderate velocity it became luminous outside, ceasing to be so the moment the revolution stopped. Here the fluorescence was evidently shown to occupy time; indeed, the full time of a revolution; and taking advantage of that, the self shining of the body was separated from its illumination within, and the fluorescence made to assume the character of phosphorescence. Another cylinder was covered with crystals of nitrate of uranium, a hot saturated solution having been applied over it with a fine brush. The result was beautiful. A moderate degree of revolution brought no light out of the box; but with increased motion it began to appear at the edge. As the rapidity became greater, the light spread over the cylinder, but it could not be carried over the whole of its surface. It issued as a band of light where the moving cylinder left the edge of the box, diminishing in intensity as it went on, and looking like a bright flame, wrapping round half the cylinder. When the direction of revolution was reversed, this flame issued from the other side; and when the motion of the cylinder was stopped, all the phenomena of fluorescence or phosphorescence disappeared at once. The wonderfully rapid manner in which the nitrate of uranium received the action of the light within the box, and threw off its phosphorescence outside, was beautifully shown.

The electric light, even when the discharge is in rarefied media, or as a feeble brush, emits a great abundance of those rays, which produce the phenomena of fluorescence; but then if these rays have to pass through common glass they are cut off, being absorbed and destroyed even when they are not expended in producing fluorescence or phosphorescence. Arrangements can, however, be made, in which the advantageous circumstances can be turned to good account with such bodies as Becquerel's phosphori or uranium glass. If these be enclosed within glass tubes, having platinum wires at the extremities, and which are also exhausted of air and hermetically sealed, then the discharges of a Ruhmkorff coil can be continually sent over the phosphori, and the effects both fluorescent and phosphorescent be beautifully shown. The first or immediate light of the body is often of one colour, whilst on the cessation of the discharge, the second or deferred light is of another; and many variations of the effects can be produced.

In connexion with rarefied media, it may be remarked that some of the tubes by Geissler and others have been observed to have their rarefied atmospheres phos-

phorescent, glowing with light for a moment or two after the discharge through them was suspended. Since then Becquerel has observed that oxygen is rendered phosphorescent, *i.e.* that it presents a persistent effect of light, when electric discharges are passed through it. I have several times had occasion to observe that a flash of lightning, when seen as a linear discharge, left the luminous trace of its form on the clouds, enduring for a sensible time after the lightning was gone. I strictly verified this fact in June, 1857, recording it in the *Philosophical Magazine*,* and referred it to the phosphorescence of the cloud. I have no doubt that that is the true explanation. Other phenomena, having relation to fluorescence and phosphorescence, as the difference in the light of oxygen and hydrogen exploded in glass globes, or in the air, were referred to, with the expression of strong hopes that Becquerel's additions to that branch of science would greatly explain and extend them.

CALOMEL AND LIME-WATER.

When calomel and lime-water are mixed together, and the suboxide formed, separated by filtration, mercury may be detected in the filtrate, as those who have tested the clear solution are aware.

I have nowhere seen this reaction explained. In Dr. Pereira's *Materia Medica* we find it stated, that "suboxide of mercury is precipitated and chloride of calcium remains in solution." Professor Graham, in his *Elements of Chemistry*, mentions two double salts of mercury with lime. These are obtained by dissolving chloride of mercury in chloride of calcium to saturation, when crystals will separate, found to contain Ca Cl + 5 Hy Cl + 8 HO. The other forms on evaporating the "mother liquid," when crystals are obtained, Ca Cl + 2 Hy Cl + 6 HO.

It may be inferred then, that when calomel and lime-water are shaken together, a portion of mercury combines with the latter to form a double salt, which remains in solution. If the liquid, free from the suboxide, is evaporated, mercury may still be found in the concentrated solution—proving the great solubility of the compound. Whether the supernatant portion is serviceable as a lotion, would be worth knowing, but as an eminent surgeon lately directed the suboxide to be separated by filtration, and the clear solution to be used, I should imagine that it is efficacious.

It may be remarked, although probably known, that subchloride of mercury, in the proportion of ten grains to a fluid ounce of lime-water, is not entirely decomposed, a considerable quantity of calomel remaining with the suboxide. In the proportion of five grains to the ounce the action is almost or quite complete, varying with the purity or impurity of the lime-water.

W. M. Rogers.

1, *Piccadilly, Manchester, August*, 1859.

A SUBSTITUTE FOR LINT.

Mr. J. R. A. Douglas, formerly house surgeon, Middlesex Hospital, in a letter to the *Lancet*, July 23, recommends the following substitute for lint, which is in extensive use in the Parisian hospitals:—

"I have Anglicized it by the name of 'pink,' as pinking is the process by which it is made. It is merely cheap cotton perforated by a common punch. The long-cloth is folded some fourteen times, and holes are driven through it with a hammer and a sixpenny punch on a piece of lead. The holes are about one-eighth of an inch in diameter, and twice their breadth from each other. My firm having been for many years surgeons to Messrs. Curtis and Harvey's powder-mills, I have had opportunities of testing it in burns and other large suppurating surfaces. These being extremely sensitive, do not require the removal of the pink so frequently as lint or other applications, as the pus passing through the perforations is easily removed with a soft sponge, which cannot be done with other applications, nor will the highly vascular granulations in burns bear the sponge when uncovered. I have found it very useful in gunshot wounds, and in compound fractures, where, as a perforated

* *Philosophical Magazine*, June, 1857, p. 506.

bandage, it gives support without confining the discharge, which never accumulates under it; and when removed, the surface is covered with healthy lymph, without pus. Mr. Ashbee, the intelligent manager of Messrs. Curtis's powder mills, has promised to prepare some linen or cotton by their elaborate machinery, if possible; in the mean time, the hospital patient, nearly convalescent, would be grateful for the occupation to relieve his monotony, and the cheapness of material and instruments makes it worthy of trial. Any ointment may be spread on it, and where large pieces are used, it can be rewashed.

DEATH FROM THE ADMINISTRATION OF CHLOROFORM.

Mr. W. J. Payne, the deputy coroner, held an inquest at St. Thomas's Hospital, on the body of Richard White, aged twenty-six, a porter in the employ of Mr. Pellatt, a wine and beer merchant, London Bridge Stores, who died in that hospital during the administration of chloroform, preparatory to undergoing an operation. From the evidence it appeared that he had received an injury of the foot in stepping from one steam-boat to another. He was removed to St. Thomas's Hospital, when it was found that he had sustained a dislocation of the ankle. This was reduced by medical treatment, but as matter formed it became necessary to remove a portion of the bone, which was done while he was under the influence of chloroform. Subsequently it was found to be still further necessary to amputate the limb, and on Wednesday, August 10th, chloroform was again administered to him by Mr. Gervis, the house surgeon, who was holding the pulse, in the presence of Dr. Bristow, Mr. Solly, and others of the medical profession. Suddenly the pulse stopped, the chloroform was withdrawn, and every known means for the purpose of restoring animation were resorted to, but without effect, as death had taken place. A *post-mortem* examination clearly showed that the cause of death was from the effects of chloroform. It was the deceased's own wish to have the chloroform administered to him. Verdict—"Died from the effects of chloroform."

SUICIDE BY NICOTINE.

Mr. Harben, a gentleman resident in King Street, Bloomsbury, last week committed suicide by swallowing nicotine. He fell dead, with the phial still in his hand. This is the second case of suicide in London by taking nicotine. The first was that of Mr. Witt, connected with the Museum of Geology, which occurred about eighteen months since.—*Lancet*, Aug. 28th.

SHEEP POISONED BY MERCURY.

Mr. James Francis, of Lusted Farm, Cudham, Kent, had been in the habit for several years of using a wash to his sheep, containing mercury and soft soap, as a preventive against flies; and had generally applied it by dipping them, but this year laid them on their side and poured the wash (one pint to a sheep) over them. The flock (about 128) having been thus dressed, were turned into a dry barren part of the field to drip. About an hour afterwards the shepherd noticed some of them looking badly; in a short space of time they began to die, and by the morning only sixteen remained alive out of the large number. It is supposed they had sucked the moisture from each other's wool, there being no water in the field, and the great heat causing thirst.

POISONING BY POTATO FRUITS.

The daughter of a gentleman at Birkenhead, fourteen years of age, lately went into the garden which adjoins the house they were staying at, and ate a quantity of potato bells (fruits). Next day she was taken very ill, and vomited a great deal. A surgeon was called in, but she continued very ill until the ensuing day, when she died.—*Lancet*, Aug. 28th.

EFFECT OF ARTIFICIAL LIGHT ON VEGETATION.

In answer to an inquiry on this subject, a correspondent of *The Builder* states: "I planted vegetables in a place where daylight could not penetrate, over which I suspended a paraffin oil lamp, with a reflector to throw the light upon the plants. They have grown up a beautiful dark green. I have also lighted a greenhouse with lamps every night, and find it not only increases vegetation, but gives a beautiful deep tinge to the plants."

TRIAL OF DR. SMETHURST.

This trial* was resumed on Monday, Aug. 15th, at the Central Criminal Court, before the Lord Chief Baron.

Mr. Serjeant Ballantine, Mr. Bodkin, Mr. Clerk, and Mr. Merewether were counsel for the Crown, and Mr. Serjeant Parry and Mr. Giffard appeared for the prisoner.

The evidence adduced on this day was a repetition of that already given in this Journal. On Tuesday the examination of witnesses was resumed. Dr. Julius repeated his former evidence, and in cross-examination stated that the medicines he administered to the deceased were chalk mixture and catechu, compound tincture of camphor, grey powder, and compound ipecacuanha powder. He also administered quinine, diluted sulphuric acid, diluted prussic acid, ether, and gentian. The prussic acid was administered under the prisoner's prescription. He never prescribed bismuth, nitrate of silver, or acetate of lead. He did not mention that the lady was in a state of pregnancy before the last trial: until the *post-mortem* examination he had no means of ascertaining the fact, and it would not have made any difference in the treatment if he had been aware of it.

Dr. Bird stated that Dr. Julius did not tell him before he visited the deceased that he entertained any suspicions as to the illness, but after he had been in attendance for three days, he formed an opinion that something was being administered which had the effect of counteracting the medicine he was giving. The deceased, more than once, in the presence of the prisoner, expressed a wish for further medical assistance, and it was after this that Dr. Todd was requested to attend. The prisoner subsequently told him that the pills prescribed by Dr. Todd produced violent palpitation of the heart. Witness had never before heard of sulphate of copper and opium producing such an effect. On the 30th April two evacuations were procured, and were numbered 1 and 2, and forwarded to Mr. Buzzard. Witness stated that he had never been present at a *post-mortem* examination where the death arose from the administration of arsenic in small doses. He certainly had formed the opinion that the deceased was the subject of slow arsenical poisoning, but Dr. Julius had suggested the probability of this being the case. Corrosive sublimate would have produced the same results and symptoms, and would not necessarily have been attended with salivation. Witness then detailed the particulars of the medicines he prescribed for the deceased, and the quantities of the several ingredients of which they were composed.

Mr. Caudle, assistant to Drs. Julius and Bird, deposed to having made up the whole of the medicines prescribed for deceased, and stated positively there was no arsenic nor antimony in any of the medicines prepared by him. One of the prescriptions given by the prisoner contained Scheele's prussic acid, the quantity of which he considered very large, and feeling nervous, witness reduced the strength by using the acid of the Pharmacopœia. There were antimony and some preparations of arsenic in the surgery, but they were kept locked up in a cupboard by themselves. After the death of deceased, witness gave samples of all the ingredients he had used in preparing the medicines, in order that they might be analyzed by Dr. Taylor.

Mr. Buzzard, M.R.C.S., deposed that he had received the two sealed bottles, marked 1 and 2, which he had handed over to Dr. Taylor.

Mr. Richard Barwell, M.R.C.S., deposed to having made the *post-mortem* examination in the presence of Drs. Julius and Bird. The brain, the heart, the lungs, and the liver were healthy. The deceased appeared to be between five and seven weeks advanced in pregnancy. On examining the stomach he found at one end a large black patch, but there were no ulcers nor any appearance of acute inflammation.

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* See vol. xviii., page 630, and page 151 of our last number.

He had heard the evidence as to the symptoms exhibited by the deceased, and could not reconcile them as the result of any disease with which he was acquainted, but they were quite reconcilable with the fact of some irritant having been frequently administered. Witness placed a portion of the contents of the stomach and the intestines in a jar, which he sealed and delivered to Mr. M'Intyre, to be conveyed to Dr. Taylor for examination.

Dr. Wilkes, Demonstrator of Anatomy at Guy's Hospital, stated that he was present when Dr. Taylor made an examination of the intestines of the deceased, and he agreed with the last witness as to the appearances they presented. He also was of opinion that the death of the deceased was most probably to be accounted for by some irritant poison.

Dr. Todd stated that Dr. Julius told him the nature of the case before he saw the deceased, but did not tell him of his suspicion that some irritants were being administered. When he saw deceased, he observed a peculiar expression of countenance—an expression of terror, as though she was under the influence of some one, and not in accordance with the appearance of a patient suffering from an ordinary disease. He at once had the impression that she was suffering from the effects of some irritant poison, and he directed Dr. Julius to make up the sulphate of copper and opium pills, with a view of allaying the irritation. In his belief the death was occasioned by the administration of some irritant, such as arsenic, antimony, or corrosive sublimate. The only disease that could in any way account for the symptoms, would be what is called acute dysentery.

Evidence was then given that during the month of April the prisoner had about £150 to his credit at the London and Westminster Bank, and on the 16th of April a sum of £71 5*s*., the amount of dividend of the deceased, was paid to his credit.

Mr. Buzzard was recalled, and stated that he was present when Dr. Taylor began to analyze the contents of the bottle. He did so by what is called Reinsch's test, and showed witness some crystals of arsenious acid, and the copper that was used was coated with a dark grey substance. The only test used by Dr. Taylor was what is known as Reinsch's.

Dr. C. M. Babington deposed that during his practice he had seen many cases of acute dysentery, and in his opinion none of the symptoms exhibited by deceased were a proof that she died from that disease.

Dr. Lewis Bowerbank stated that he had practised in Jamaica more than twenty years, where acute dysentery was prevalent. The symptoms of the deceased were not reconcilable in any way with that form of disease, but in his opinion were the effects of some irritant poison.

Dr. Copland gave similar evidence.

On the third day *Dr. Alfred Swaine Taylor* was examined, whose evidence, as given before the magistrates, was corrected in one important particular. Dr. Taylor observed: "In one of the bottles, that was numbered 5, I found 355 grains of chlorate of potash, a matter which is used in making percussion-caps or any explosive mixture. I examined another bottle, No. 21, which appeared to contain a clear watery liquid of a saline taste, and I tested a portion of the contents by Reinsch's test, and upon first trying the copper it was entirely consumed. I made a further test, which led me to suppose that there was arsenic present in the solution, but it turned out that I was mistaken, and that it did not contain either arsenic or antimony, and that the arsenical appearances originally produced came from the copper gauze. Chlorate of potash is a cooling medicine.

By the Court.—By the destruction of the copper the arsenic contained in it was set free, and this destroyed the effect of the experiment.

Examination continued.—Chlorate of potash would act upon the kidneys and carry off any matters contained in them. (Dr. Taylor concluded by stating, that from the symptoms exhibited by the deceased, and the manner she was treated, he could ascribe the death to no other cause than the administration of some irritant poison.)

Cross-examined by *Serjeant Ballantine*.—I was examined several times upon this inquiry. The quantity of arsenic that I discovered I should say was less than half a grain. I discovered the presence of arsenic by using copper gauze of the same description that I used afterwards to the contents of the bottle No. 21. In the experiment I made with this bottle the arsenic was deposited by myself. The reason of the failure of the experiment was that this bottle was the only one that contained chlorate of potash, and this destroyed the copper. Dr. Odling also came to the conclusion that the bottle contained arsenic, and we both stated that fact in our exami-

nation before the magistrates and the coroner, and we were of course both mistaken. We believed, no doubt, at the time that the arsenic we found was contained in the liquid. I also told the magistrates that I had tested all the materials I used in my tests, before I commenced making the analysis, to see if they were pure. I have used the same description of copper gauze for a great many years, and never before discovered the presence of arsenic in it. I shall certainly continue to use it, but I shall take care not to do so with chlorate of potash.

Serjeant Parry here asked for the depositions of Dr. Taylor taken before the magistrates, and a portion of it was read. It was to the effect that he had discovered the presence of arsenic in the bottle No. 21, in which there was chlorate of potash, and that the latter was a harmless saline mixture, acting upon the kidneys, and that if poison had been administered in it, its effect would probably be to carry off the noxious ingredient from the body very quickly, but that by the repetition constantly of such a proceeding chronic inflammation of the intestines would be created, which would yield to no treatment, and would end in the death of the patient from exhaustion.

The deposition made by Dr. Taylor before the coroner was also put in. It was to the same effect as that made by him before the magistrates. In the course of it Dr. Taylor stated that he had tested a box of homœopathic pills that were found in the prisoner's lodging, and found they were composed of starch, gum, and sugar, which were the usual ingredients of which he discovered those pills to be composed.

Cross-examination continued.—At the time I gave this evidence I firmly believed that arsenic was contained in the mixture, and that it had not come there from my test, but had been placed there by some one. When I was examined before the coroner, I expressed my opinion to be that the death was more referable to antimony than to arsenic. The finding of the arsenic in the bottle did not have any effect upon the opinion I subsequently formed in reference to the case. The moment I discovered the mistake that had been made, I gave the information to Serjeant Ballantine. Dr. Odling made an independent examination of a portion of the contents of the bottle in question, and Dr. Brand also analyzed some part of it, and we all came to the conclusion that there had been a mistake in the first instance. My tests have been disputed and contested before this occasion, but no instance ever occurred where I was proved to be wrong. Supposing no chlorate of potash or other ingredient had been made use of to carry off the arsenic in a case of arsenical poisoning, I should expect, as a general rule, to find arsenic in the tissues of the body. No arsenic was found in the body of the deceased. I did not form my theory, to account for the absence of arsenic from the tissues of the body, in consequence of finding, as I supposed, the arsenic in the chlorate of potash. I was examined as a witness in the case of Mr. Wooler, who was charged with the murder of his wife by slow poisoning. In that case there was no doubt that death was the result of arsenic, and the only question was by whom that poison was administered. I found a grain of arsenic in the liver of Mrs. Wooler. I did not examine the stomach of that lady. In a case of slow arsenical poisoning the vessels of the stomach might be found gorged with blood. That was so in the present case. There were a variety of symptoms attending slow poisoning by arsenic. Sometimes the poison caused eruptions on the arms and hands, excoriation of the nostrils, and a hacking cough. A clammy sweating would be one of the consequences of antimonial poisoning, unless there was diarrhœa and vomiting. The action of small doses of antimony upon the liver would be to enlarge the liver, and cause a deposit of fat on that organ. I do not think that antimony would have the effect of softening the liver.

Re-examined.—After Dr. Odling and myself had given our evidence relative to finding the arsenic in the bottle, we thought it was possible there might be some mistake, and we made other experiments to satisfy ourselves. We made seventy-seven experiments with the same copper gauze, and in seventy-six of them no arsenic was discovered, and the only instance in which it was found was in the evacuation. I have been engaged in making these experiments for twenty-nine years, and such an occurrence as the one referred to never took place before. In cases of slow arsenical poisoning some of the symptoms I have mentioned would be found in each particular case.

By *Serjeant Ballantine.*—Arsenic is sometimes found in bismuth.

Mr. Barwell was recalled, and in answer to questions put by Serjeant Parry, he said he found the liver of the deceased enlarged, hardened, and in an incipient state of fatty degeneration. The liver was very much hardened in the left lobe, and this might have been the result of continuous bilious irritation.

Dr. Odling, the Professor of Practical Chemistry at Guy's Hospital, proved that he assisted in analyzing a portion of the intestines of the deceased, and he agreed in the statement made by Dr. Taylor as to their condition, and said he was satisfied that there was antimony in the body. He then gave the same account of what took place with reference to the examination of the bottle containing the chlorate of potash.

By the *Judge*—Unless the copper is dissolved, Reinsch's test is infallible in the discovery of arsenic.

By *Serjeant Ballantine*—I agree with the other witness that the death of the deceased arose from the administration of some irritant poison, and I do not know of any disease that would account for the symptoms that have been spoken to.

Dr. Brand deposed that he examined the contents of the bottle No. 21, and found that it did not contain arsenic. He also stated that the reason of the failure of the experiment made by Dr. Taylor was, the copper being dissolved by the chlorate of potash.

By the *Court*—The condition of the copper was not supposed, until this occurrence took place, to have any effect upon the test, and if he had made the experiment at the time Dr. Taylor did, he should have also been of opinion that there was arsenic in the substance.

Mr. Serjeant Parry then addressed the jury for the prisoner in an eloquent speech, which occupied more than three hours in delivery.

The following evidence was then adduced for the prisoner :—

Mr. J. E. Rogers, late Lecturer on Chemistry at the Grosvenor School of Medicine, deposed that he was acquainted, by reading, with the symptoms of slow poisoning by arsenic. He knew the nature of chlorate of potash, which was a perfectly harmless salt ; in his opinion, it would have no effect in eliminating poison from the system. He had given chlorate of potash, as an experiment, with arsenic and antimony, and it had no effect whatever. Supposing arsenic and antimony to have been administered for five or six weeks, he should expect to find it in the tissues of the body ; and not finding it, he should form the opinion that no poison had been administered. He could state positively, from his own experience, that nearly all the bismuth that was sold contained arsenic, to the extent of half a grain to the ounce. He did not consider Marsh's test for the discovery of arsenic in bismuth, a correct one. Grey powders frequently contained antimony, and he should say a greater proportion than bismuth would contain arsenic. Witness stated, in cross-examination, that he was examined on behalf of Palmer, to prove that as no strychnine was found in the body, Cook could not have died from strychnine, and that he still entertained that opinion.

Mr. John Lewis Thudicombe deposed, that he was a doctor of medicine, and lecturer on practical and experimental chemistry. He was connected with the Grosvenor School of Medicine; he had heard the evidence of the symptoms exhibited by the deceased, and the appearances presented upon the *post-mortem* examination, which in his opinion were all consistent with the deceased having died a natural death, from the disease known as diphtheritic dysentery. Witness made an analysis of grey powder, and found it to contain arsenic and antimony. He had also analyzed bismuth, and found that it contained both arsenic and antimony; he could not say the quantity; he found more than a trace. In one instance, in 120 grains of bismuth he found about half a grain of arsenic. He would not state exactly what quantity of grey powder he analyzed; he could have stated it, but had not had time to ascertain the exact quantity. The grey powder he analyzed was the description given to children. It was not given several grains at a time; one-twelfth of a grain was sufficient, but he was sorry to say that it was frequently given to children in doses of half a grain to three or four grains. He thought the quantity of arsenic and antimony contained in the bismuth and grey powder would account for a small portion of arsenic being found in an evacuation.

Dr. F. Webb, also connected with the Grosvenor School of Medicine, gave similar evidence to that of the last witness as to the cause of death, and was of opinion that the deceased died of dysentery.

Dr. G. F. Girdwood deposed, that he had very great experience in midwifery, and had seen many cases in which pregnancy was attended with dysentery, to which he attributed the death of the deceased. He considered it highly improper to administer mineral medicines in such a case.

Dr. W. Tyler Smith stated he had devoted great attention to cases of midwifery, and that excessive vomiting was often a symptom in early stages of pregnancy, and he had known instances in which it had been fatal.

Mr. Serjeant Ballantine then replied upon the whole case.

After which the Lord Chief Baron commenced summing up, which was not concluded till the following day (Friday), having occupied eight hours and three-quarters. The jury retired at ten minutes to four to deliberate on their verdict, and returned into court at half-past four with a verdict of *Guilty.*

The Lord Chief Baron was about to pass sentence, when the prisoner pulled a paper from his pocket, and addressed the court for about twenty-five minutes, protesting that he was innocent of the charge.

The Lord Chief Baron having referred to this statement, which he observed was contradicted by the sworn testimony of witnesses, as well as by the evidence under the prisoner's own hand, proceeded to pass sentence in the usual manner. The prisoner was then removed from the dock.

TO CORRESPONDENTS.

Notice.—*W. Richards* (Falmouth) will feel greatly obliged to any reader of this Journal who will favour him with the address (by letter) of Mr. or Mrs. Nelson, Photographers.

Sale of Poisons.—*Mr. G. Burrell* (Montrose) has sent us the particulars of a case of intended suicide which was prevented in the following manner:—A man having applied for some prussic acid for the purpose, as he alleged, of killing rats, Mr. Burrell's assistant retired for a minute, and returned with the bottle duly *labelled* with the article required, but which he in the meantime had filled with water and a few grains of Rochelle salt, to give it a flavour. The man was subsequently apprehended on a charge of robbery, but just before the officers seized him he drew forth the bottle and swallowed its contents, placidly informing the officers that he had taken poison, and would in a few minutes be beyond the reach of human law. He has subsequently been committed to prison, and is none the worse for the dose.

A. H. suggests that Patent Medicine Stamps should be pierced and gummed, the same as postage stamps, to facilitate their use.

Anti-Quackery sends an advertisement by a Member of Council which he thinks is not consistent with the position occupied by the advertiser.

A. J. (Liverpool).—We have no knowledge of the action of iodide of potassium on dogs. The question is not suited to this Journal.

A Registered Apprentice (Southampton).—On adding lime-water to chloride of zinc, oxide of zinc is precipitated and chloride of calcium left in solution, and these do not react upon calomel. If the lime-water be added to calomel, black oxide of mercury is precipitated, with chloride of calcium in solution, to which chloride of zinc may be added without altering the appearance of the mixture.

A Member (Bristol) will see that his suggestion is carried out in the present number.

C. H. (Manchester).—*Acidum Nitro-muriaticum dilutum.* Equal parts of the diluted nitric and muriatic acids.

R. V. (Liverpool).—See vol. xvii., page 440.

Planorbis Corneus.—We have received a communication under this signature, which we should be glad to publish if the author will forward his name.

Calcium (London).—The lime used in London is prepared principally from the chalk formation, and not from the lime stone used in many parts of the country, which accounts for the difference in colour alluded to.

A. P. S. (London).—*Marking Ink.* Vol. vii., p. 183.

R. H. W.—*Pharmaceutical Latin Grammar,* Ainsworth's *Latin Dictionary,* Balfour's *Manual of Botany.*

J. W. R. (Calcutta).—*Cod Liver Oil and Quinine.* See vol. xiv., p. 427, and vol. xv., p. 239. *Cod Liver Oil and Iodide of Iron.* Vol. xvii., p. 36.

Z. (Westminster).—(1.) Water. (2.) The dose of lupuline is from 6 to 12 grains. The other questions we are unable to answer.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.
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THE EVIDENCE IN DR. SMETHURST'S CASE.

The trial of Dr. Smethurst on the charge of having poisoned Isabella Bankes, has excited such general and intense interest among all classes of the public, and so many questions have arisen out of it, relating to the mode of conducting criminal prosecutions, and the value of medical and chemical evidence in such cases, that it seems necessary to record in this Journal more completely than has yet been done, the facts and opinions that have been adduced, especially in reference to the controverted points. In doing this we shall have occasion to repeat some parts of the evidence we have already published, but such parts only will be given as are deemed important, or seem likely to be referred to hereafter.

The deceased lady, Isabella Bankes, appears to have been forty-two years of age, and unmarried, when, an attachment having sprung up between Dr. Smethurst and her, a marriage was effected between them, although he still had a wife living. Dr. Smethurst and the deceased now lived together as man and wife. She became pregnant, and at about the same time was taken ill, being affected with vomiting and diarrhœa. Medical assistance was called in, but the complaint, which was considered to be bilious diarrhœa, did not yield to the treatment adopted. Further advice was obtained, but the vomiting and purging continued in spite of all the means resorted to for their suppression, and the medical men, who were not aware of the existence of pregnancy, suspected that the patient was suffering from some irritant poison continuously administered. This suspicion became so strong, that Dr. Smethurst, the reputed husband of the patient, was charged before a magistrate with attempting to poison his wife. When this charge was first made against Dr. Smethurst he was admitted to bail, but the patient having died the following morning, Smethurst was again apprehended on a charge of wilful murder. Previous to this apprehension, some of the evacuations of the patient had been obtained by the medical attendants, and sent for analysis. At the time of the decease, and for two days previously, the sister of the deceased was with her; with this exception, Dr. Smethurst had the entire charge of the patient, and by him all food and medicines were administered. When the prisoner was apprehended on the charge of murder, a large number of substances contained in bottles found in the possession of the prisoner were seized, and sent, together with parts of the body, to be analyzed. These were all submitted to Dr. Taylor, who was assisted in the examination of them by Dr. Odling. At the examination before the magistrates, the disreputable nature of the connexion between Dr. Smethurst and the deceased having been shown, as well as the motive supposed to have actuated the former in seeking the life of the unfortunate lady, whom he induced to bequeath to him all the property, about £1800, over which she had control, medical evidence was given to show that the symptoms and death of the deceased could not be referred to any known natural disease, but were consistent with the effects of some irritant poison administered in small repeated doses; and this was followed by chemical evidence to the effect that arsenic mixed with chlorate of potash in solution was contained in one of the bottles, numbered 21, found in the prisoner's possession, and a small quantity of arsenic in an evacuation which had been sent for examination previously to the death of the deceased. Chlorate of potash was also found in a bottle, No. 5, but nothing calculated to excite suspicion was found in any of the other bottles and packets of medicines, thirty-seven in number, which had been taken for analysis; nor was arsenic found in any part of the body of the deceased. Dr. Taylor stated on this occasion that the bottle

No. 21 contained a solution, in each fluid ounce of which there were seven grains of chlorate of potash and one grain of arsenious acid. He represented the chlorate of potash as an innocent sort of medicine, occasionally used in dysentery, diarrhœa, cholera, scarlet fever, and other biliary complaints; that its properties were diuretic; and that it would therefore tend to purify the system from all noxious matter. He thought that if mineral poison were administered with chlorate of potash, the surplus would be carried off rapidly. The mixture contained in bottle No. 21 had a cooling saline taste, which was not disagreeable, and it might be mixed with any kind of food and swallowed without the person being aware of it. He believed that the effect of giving small doses of this mixture from time to time would be to produce nausea, vomiting, pain in the bowels with purging, and, if the doses were continued, it would produce chronic inflammation and ulceration of the bowels and stomach, the ultimate effect being to slowly lead to death by exhaustion.

Upon this evidence the prisoner was committed for trial on the charge of wilful murder. A report of the case, as heard before the magistrates, is contained in the number of this Journal for June, 1859. Some interest was excited in reference to the chemical evidence, from the fact that difficulty was experienced in detecting the arsenic in the solution with chlorate of potash. It appeared that the only test used by the Chemists was that known as Reinsch's test, which consists in acidulating the liquid with hydrochloric acid, and then heating it in contact with a piece of bright metallic copper, when arsenic, if present, is deposited on the copper. Operating in this way the copper was rapidly dissolved, a result which was found to be due to the action of the chloric acid of the chlorate of potash, which was decomposed in the presence of hydrochloric acid. The manner in which this result was described in the published reports of the evidence, and the explanation given by the principal chemical witness in the attempt to show that death might be caused by repeated small doses of arsenic without any trace of the poison being left in the body after death, were the points in the examination before the magistrates and the coroner which attracted most attention among scientific men. The pregnancy was discovered at the *post-mortem* examination of the body, but no stress was laid on the fact, nor did it appear in any degree to alter the previously formed opinion of the medical witnesses, who were men of reputation and high standing. The conduct of the prisoner in leaving his lawful wife and going through the ceremony of marriage with a lady, who, having lived in the same house with his wife and him, must have known that he was already married, although in some degree unaccountable, could not fail to excite a strong prejudice against him in the public mind, and this was strengthened by the further fact that, while his unhappy victim was at the point of death, he induced her to make a will in his favour. The suspicions of the three medical men who attended the patient having ripened into a settled conviction, founded upon the symptoms they observed, that the case was one of slow poisoning by some irritant poison, and this being strengthened by the discovery of arsenic in an evacuation, and as supposed, of the same poison, associated with chlorate of potash, in a bottle found in the possession of the prisoner, it only remained to account for the non-discovery of the poison in the tissues of the body to render the case one of more than suspicion against the prisoner. The required explanation was furnished by Dr. Taylor, whose theory of the action of chlorate of potash seemed to supply the required link in the chain of evidence, and to leave small doubt, not merely of the guilt, but of the skilful design of the accused. For what purpose, other than that suggested, could a mixture of chlorate of potash and arsenious acid have been made? How could arsenic be found in the evacuations without a trace of it being capable of detection in the tissues of the body, unless it had been given in connexion with some substance by which "the surplus would be carried off rapidly?" Who could have administered the poison but he who was the sole attendant upon the patient, and by whom all her food and medicines were given to her?

Such was the case, as far as known to the public, when the trial of Dr. Smethurst, of which a brief report is given in our last number, occurred. The medical evidence for the prosecution was similar on this occasion to that which had been given before the magistrates, but an important alteration was made in the chemical evidence. The Chemists had discovered that they were mistaken in concluding that solution No. 21 contained arsenic as well as chlorate of potash. The arsenic, they now said, came from the copper used in the experiment. This part of the case, therefore, was given up, and the beautiful theory, to account for the continued administration of arsenic without its being absorbed or retained by any of the tissues, lost in consequence much of its effect. The chemical witnesses, it is true, still adhered to their statement that arsenic was found in an evacuation which was sent them for analysis before the death of the patient, but having admitted a mistake in one analysis, what confidence could be placed in the other, which was made with the same impure copper? The explanation offered that the arsenic found in solution No. 21 was set free from the copper gauze by the action of the chloric acid, cannot be received as satisfactory, for the quantity of copper capable of being dissolved by the products of decomposition of seven grains of chlorate of potash, could not, in the opinion of practical men, yield one grain of arsenic from any sample of fine copper gauze. The whole of the chemical evidence on this point requires to be thoroughly sifted before its value can be determined. It does not indeed appear to have been much relied upon in the course of the trial, or in the discussion which has subsequently taken place. There was obviously no sufficient evidence that the deceased died from the effects of arsenic. The medical witnesses for the prosecution ventured only to assign the death to some irritant poison. It might be arsenic, or antimony, or corrosive sublimate. The evidence for arsenic was next to nothing. Antimony, however, was found in some of the viscera, although not in the evacuations. Mercury was not found at all. While the Chemists for the prosecution were compelled to admit that the arsenic they found in one of their most important results, was derived from impurity in the test employed, the Chemists for the defence, whose opinions were altogether at variance with those given on the other side, endeavoured to show that the arsenic in the evacuation and the antimony in the viscera may have been derived from impurities in the medicines which were administered, and thus grey powder has been brought into temporary disrepute by the allegation made at the trial that it generally contains both arsenic and antimony. This will also require a further investigation before its value can be determined.

The medical evidence, like the chemical, was conflicting, one set of witnesses asserting that the symptoms were not those of any natural disease, and could only be referred to the action of some irritant poison, while the witnesses on the other side as confidently asserted the contrary. Here, however the witnesses for the prosecution had a manifest advantage over those for the defence, as the former alone had been at the bedside of the patient. The chemical evidence having to some extent failed, the presence of poison in the body having been but doubtfully proved, and no poisonous agent having been traced to the prisoner, the case rested principally upon the medical evidence, but the question arose, and still remains undecided, as to whether, in the existing state of medical knowledge, it is possible to indicate with certainty that symptoms such as those referred to in this case were caused by the action of certain mineral poisons? In the verdict of the jury the utmost importance was given to the opinions of the medical witnesses on the side of the prosecution. They believed and asserted that their patient suffered and died from the effects produced by some mineral poison given in small but repeated doses, and if this were so, no one but the prisoner could have administered the insidious but deadly agent.

The following communications, which have been published since the trial, give in a concise form the opinions of the two principal medical witnesses, one for the prosecution, and the other for the defence.

Dr. R. B. Todd, one of the physicians to King's College Hospital, says:—

In my evidence on the trial, I stated that the poisons used were, in my opinion, antimony, arsenic, and corrosive sublimate.

Antimony was found in the tissues of the body; and the excessive vomiting from which Miss Bankes suffered was explained by the frequent administration of that poison.

Arsenic was found in one of the discharges from the bowels, and a peculiar morbid change in the lining membrane of the stomach was decidedly indicative of the irritation of arsenic. It is not improbable that the vomiting was partly due to arsenic; and the peculiar constriction in her throat, of which she complained frequently, was also in part at least due to that drug.

No trace of arsenic, however, was found in any of the organs or in the blood. But how could it have been, for with or after every dose there was given a certain quantity of antimony, which did not allow the metallic agent to remain long enough for its absorption, and barely sufficiently long to cause a slight irritation of the stomach and throat?

This poison was used, I have no doubt, very cautiously and in comparatively small quantities, and most probably only during the last ten or fourteen days. It was not intended to employ this agent otherwise than in aid of others, to promote their action and to confuse the medical attendants by modifying symptoms, and to divert the attention of the chemical investigators from the poison which was really the most destructive. Perhaps, also, it may have been thought that the employment of arsenic might embarrass the Chemists in drawing conclusions from their tests.

Of the third poison—the bichloride of mercury, commonly called corrosive sublimate, although it has been ignored by the Chemists, and, notwithstanding that other medical witnesses for the prosecution have not seemed to attach importance to it, I have no hesitation in expressing my opinion that it was the principal agent in causing the death of the victim, aided very much by antimony and slightly by arsenic.

It must be admitted, however, that two most important points were wanting in the evidence in favour of this view; and it was the absence of these proofs which, no doubt, prevented the counsel for the prosecution from directing the attention of the jury more fully to the influence of this poison.

The proofs to which I allude were the detection of the mineral in the body of the patient, and the occurrence of that which so often follows the administration of mercurial agents—namely, salivation.

That no trace of mercury was found in the tissues or in the bowels, I ascribe chiefly to its having been given in small doses, accompanied by more or less of antimony. It passed through the bowels rapidly, and was either not at all absorbed into the blood, or in such minute quantities as admitted of a rapid elimination. Its action was, therefore, purely topical upon that part of the bowel towards which it has an affinity, and it is not improbable that its energy as a purgative was greatly increased by the combination with antimony, while its specific action in producing salivation was diminished by the same combination.

It is not improbable that Miss Bankes may have been one of those persons whom mercury cannot salivate.

But another drug was given which tended to prevent the salivation, the occurrence of which would have instantly led to the detection of the poison employed. This drug was chlorate of potash.

It had become known early in the inquiry that the prisoner had employed this drug without the sanction, and, if I am not mistaken, without the knowledge of the attending medical men.

It had been suggested that the object of giving chlorate of potash was to promote the elimination of arsenic, and that the prisoner was aware of the fact (new to the most experienced chemical analysts) that chlorine will dissolve out arsenic from its association with copper.

The influence of chlorate of potass as an eliminator of arsenic is new in medicine, so far as my reading and experience inform me; and it seems to me highly improbable that this is true; nor do I believe that the drug was used for that purpose. Not less improbable is it that the prisoner, a man certainly not of a high order of education, nor devoted to scientific pursuits, should have been familiar with a delicate point of chemical analysis hitherto undiscovered. The admission of either or both of these propositions would tell materially against the prisoner, as indicating that his mind had been much directed to the study of poisonous agents.

That the chlorate of potass was used with reference to the administration of mercury and not of arsenic is clearly suggested to me by the testimony of the very last witness for the defence. It seems that as long ago as February last the prisoner was anxious to discover something which would correct a foul smell on the breath. He applied to the witness, a dentist, who recommended him chlorate of potass for this purpose.

Now chlorate of potass is a known remedy for the foulness and fœtor of breath which arise from salivation. It is often used to moderate salivation, to promote the healing of the ulceration and sloughing of the mouth which accompany it, as a local application, and if given internally it is supposed by some to prevent or retard salivation.

This testimony (which had not been given while I was in court, and which I learnt from the newspapers after the conclusion of the trial) supplies an important additional link in the chain of evidence in favour of bichloride of mercury having been much relied upon by the poisoner. He knew how important it was to prevent salivation, and he did not wish to trust to antimony alone.

Is it impossible, even now, to find out where he got his chlorate of potass?

I would also ask, is it impossible to make a further search for mercury? If the body were disinterred I should recommend that the salivary glands should be examined.

Additional proof that bichloride of mercury was used is furnished by the symptoms. These symptoms were those of a dysenteric diarrhœa of the most acute and irritant, and, at the same time, of a peculiar kind, and the most important question raised by the defence was as to the probability that this was, in reality, a case of disease arising from natural causes and not from poisoning.

It will be remembered that the symptoms under which the deceased lady suffered were those of a severe and obstinate diarrhœa, accompanied by frequent bloody discharges, with incessant vomiting, and of the most distressing kind, to which must be added the frequent complaint of a peculiar burning sensation in her throat. There was abdominal tenderness, and, on one occasion at least, a peculiar rigidity of the abdominal muscles forcibly excited by the least pressure. These symptoms, it will be further remembered, not only resisted a variety of appropriate remedies, such as in the most severe cases generally give at least a temporary relief; but latterly, in the most mysterious way, they seemed aggravated by each medicine in succession to an alarming extent, and led to the objectionable practice of frequent change of remedies. Thus, among other instances, one or two pills, consisting of a quarter of a grain of sulphate of copper and a third of a grain of opium, in all (if two had been taken) half a grain of the first and two-thirds of a grain of the second, seemed to produce a frightful increase of every symptom, including the peculiar burning sensation of the throat—a result which no medical man could believe would arise from such a cause, and which is equally opposed to all medical experience and to the dictates of common sense.

The symptoms suggested to the medical men in attendance the existence of ulceration of the bowels of great acuteness and extent; but the intense vomiting and the peculiar throat affection were inconsistent with the opinion that the case was one of ordinary dysentery, or, in other words, a very extraordinary case of acute dysentery. Looking at all the circumstances, Drs. Julius, Bird, and myself came independently to the conclusion that the symptoms were not those of a natural disease, but were excited and maintained by the frequent administration of one or more irritant poisons of a nature to promote at once an excessive vomiting and severe diarrhœa.

We have now the additional information afforded us by the *post-mortem* examination. Acute sloughy ulcers of the upper part of the large intestine were found, and smaller and less numerous ulcers existed in the lower part of the same great division of the bowel.

The existence of such ulcers, and in such positions, was consistent with the supposition that the disease was dysentery; but they were too much in the upper part and too little in the lower part of the bowel. In fact, the position of the ulcers was reversed from that which they occupy in the natural disease. In dysentery, the ulcers are chiefly accumulated to the lowest part of the large bowel, and are least numerous in its upper part. In this case the ulcers were most numerous above, and gradually diminished in number at the lower part. The ulcers also wanted a certain degree of thickening about them which belongs to disease.

Now, these ulcerations were exactly, both in position, nature, and relative number

such as bichloride of mercury would produce. When this salt is given in small but poisonous doses, it seems to pass over the stomach and the small intestine (25 or 30 feet of bowel), and expends its action on the first part of the large bowel, sometimes the lower part of the small bowel, and in a less degree the lower part of the large bowel.

To put this matter in a plainer light, I will arrange in parallel columns the leading points which favour each view—namely, those which indicate the use of a combination of antimony and bichloride of mercury, and those in favour of the natural disease.

Poisoning.

Excessive and uncontrollable vomiting.

Severe dysenteric diarrhœa.

Absence or slight development of certain symptoms of dysentery.

Extreme rarity of very acute dysentery, especially as an isolated case, in this country.

Aggravation of symptoms on each change of remedy.

Frequent changes of remedies suggested by the poisoner.

Position occupied by the ulcers, being the reverse of that occupied by the ulcers of disease; absence of thickening of the edges of the ulcers.

Peculiar throat symptoms—the sense of burning and constriction.

The peculiar terrified aspect of the patient, unlike that of abdominal disease.

Disease.

The dysenteric diarrhœa and evacuation of blood.

The existence of ulcers in the large intestine.

To explain the excessive vomiting, the defence suggested that it was caused by early pregnancy. The advocates of this hypothesis forget that a major irritation, with scarcely an exception, controls a minor, even although in a different organ; and in such a case as this there cannot be a doubt that the excessive intestinal irritation would have kept in abeyance that from the uterine condition, had it existed. Nor, I may add, is it likely that men of large experience would overlook an irritation of that kind.

It is true that a case apparently to a certain extent in point was adduced by one of the witnesses for the defence. The case was so imperfectly reported that I could draw no conclusion from it, and most certainly I should have my fears of "foul play," or "*malapraxis*," if I met with such a combination as uncontrollable sickness, excessive diarrhœa, and pregnancy.

I have thus endeavoured fairly to analyze this very serious case, and after the most careful consideration, I find myself unable to arrive at any other conclusion than that Isabella Bankes died from the frequent administration of antimony and bichloride of mercury, with occasional doses of arsenic. Had iodide of potassium or iodine in any other form been occasionally added, the effects of the other poisons would have been enhanced.

I trust this very important case will not be lost upon toxicologists, and that it will lead to new and careful observations upon the effects of poisons in combination, upon their mode of elimination, upon the means which may be used to prevent the accumulation of them in the tissues and organs of the body, and, finally, that it will induce analytical Chemists to review carefully all the processes hitherto in use for the purpose of detecting mineral and other poisons, with a view to clear up every possible source of fallacy.

The interests of science and the good of mankind (the constant aim of the best cultivators of science) demand all this.

I need scarcely add, that it will be infinitely more agreeable to me to learn that all my arguments are fallacious, and that the innocence of the prisoner has been proved, than that another life should be sacrificed.

On the other hand, Dr. Tyler Smith, of St. Mary's Hospital, states:—

First, as regards the actual pregnancy of Miss Bankes. This was first discovered at the *post-mortem* examination by Mr. Barwell, but such little consequence was attached to it that the matter was scarcely heard of until the recent trial. It must be remarked that the duration of the pregnancy corresponded as nearly as possible to the length of the illness of the patient. Mrs. Robinson deposed that Miss Bankes

was taken ill three weeks before she left her house. She went from Mrs. Robinson's to Mrs. Wheatley's on the 3rd of April, and on the 3rd of May—seven weeks from the commencement of her malady—she died. Mr. Barwell gives seven weeks as the limit which the pregnancy might have reached at the time of death.

Was the illness of Miss Bankes such as could possibly have been caused by pregnancy?—Obstinate and irrepressible vomiting, with violent purging, were the chief symptoms detailed at the inquest, and at the trial. It is an undoubted fact, recognised by every obstetric authority, that women are often reduced to great peril, and sometimes killed, by the vomiting of pregnancy. Obstinate diarrhœa is also met with as a disorder of pregnancy, either alone or in connexion with vomiting. It is in the early part of pregnancy that vomiting is most severe and dangerous, and it often begins at the very commencement of this state. It is most likely to happen in the case of a woman such as Miss Bankes is described to have been, pregnant for the first time in mature age, of bilious temperament, and the subject of previous internal disorder. Stress was laid by some of the witnesses on the burning sensations complained of in the stomach and throat. Pregnancy is constantly accompanied by heartburn, and in certain cases there is an enormous amount of acid secretion and eructation from the stomach.

The sickness of pregnancy is commonly most distressing in the morning on first taking food, or on moving the body. This was spoken to as the fact in the case of Miss Bankes by one of the witnesses. In the worst cases, the vomiting is wholly intractable. The remedies which arrest ordinary sickness are of no avail. Food and medicine are alike rejected, and the patient dies of starvation. For the last two days of her life Miss Bankes was under the care of her sister and a nurse provided by Dr. Julius. It told very forcibly against the prisoner that at this time, although the stomach rejected medicine, it retained food. In two out of four fatal cases from this kind of vomiting in which I have been consulted the patients were able to take food for a short time before death; the sickness ceased when fatal exhaustion had set in. The same is related to have been the case in the history of Charlotte Brontë. Her biographer states that towards the close "she begged constantly for food, and even for stimulants. She swallowed eagerly now; but it was too late." Her illness is described as having lasted six weeks.

Is it possible that the physician in attendance upon Miss Bankes made an error of diagnosis in assigning poison as the cause of her illness and death? It was strongly insisted on, as a proof of poisoning, that Dr. Todd, Dr. Julius, and Mr. Bird should, either individually or concurrently, have formed the opinion that their patient was suffering from slow irritant poisoning. Against this it is only fair to place the fact that they did concurrently overlook the existence of pregnancy, although it was before them, and marked by one of its most common and distinctive symptoms. It cannot but be considered as remarkable that three medical men should have been in attendance upon a woman 42 years of age, living for the first time as a married woman, who had been suddenly seized with an illness of which vomiting was a prominent symptom, without detecting pregnancy. They appear to have been misled by the information given to them by Smethurst as to the absence of one of the common symptoms of pregnancy, and they made no examination. Smethurst himself appears not to have suspected pregnancy. As regards Dr. Todd, it may be accounted for by the circumstance that, however undisputed his great eminence as a pure physician may be, he is not accustomed to treat the disorders of pregnancy. However the fact may be, the medical attendants certainly formed a conclusion while they were without the knowledge of a very important element of the case.

Do the symptoms of a fatal case of vomiting from pregnancy so far resemble poisoning as to be liable to be mistaken for them? There is no limit to the reflex irritation which the pregnant uterus may excite in various organs of the body, especially the stomach. In my *Manual of Obstetrics*, published in 1858, I state that "an almost poisonous influence seems to be exerted by the gravid uterus in some constitutions." Several years ago I knew of a case of this kind in which poison was actually suspected.

Dr. Todd laid considerable emphasis on an extraordinary expression of Miss Bankes's countenance, such as he had never observed in a case of natural disease. Dr. Paul Dubois, the present Physician-Accoucheur to the Empress of the French, who related that he saw twenty cases of death from the vomiting of pregnancy in

thirteen years, refers to "a marked change in the features" as one of the signs indicating a state of danger, and calling for the induction of abortion to save the patient's life.

A great many cases have been referred to by correspondents in the daily papers and medical journals, to show that symptoms similar to those observed in the case of Isabella Bankes have occurred in natural disease accompanied by pregnancy. The following case is given by Dr. Quain:—

In the autumn of 1857 a lady, aged thirty-six, who had been married some ten years without any indication of having a family, returned with her husband from the country to their town house complaining of illness. She said she had a bilious attack, was sick after all food, and that there was a tendency to relaxed bowels. I treated her in the usual way, with very little success, and after two or three weeks a question arose as to the probability of her symptoms being connected with pregnancy. These symptoms went on increasing in severity, and the fact of pregnancy became established.

Another physician was joined with me in attendance, but our treatment was still unsuccessful; the lady suffered from more or less constant sickness, more or less constant diarrhœa, with much pain in the throat and in various parts of the abdomen. Two other physicians were subsequently joined in consultation. A medical gentleman was placed as resident in the house. Everything that professional skill, combined with the utmost watchfulness and attention, could do, was done in vain. She became weaker and weaker, and gradually sank exhausted within an hour of giving premature birth to a child.

During the progress of the case a question arose as to the propriety of bringing on premature delivery, but the idea was given up for reasons which it is unnecessary to mention here. I should state that so markedly did the symptoms resemble irritant poisoning, that I mentioned this impression to a friend of the lady, and, even thinking it possible that in some accidental way or other poison was being taken, I had the vomited matter chemically examined. I need not say that no poison was found.

In the face of these conflicting statements and opinions, from men alike eminent in their profession, it could hardly be said that the guilt of the prisoner had been established beyond a reasonable doubt; and no sooner was the verdict made known than indications were afforded of its being unsatisfactory to a large number of individuals, who appeared generally to consider that the extreme penalty of the law ought not to be carried out until the guilt of the convict should be proved in a more conclusive manner. The result of the urgent appeals made to the Home Secretary has been a respite of the sentence, but what the ultimate fate of the prisoner may be, remains still undecided.

In the discussions which have taken place with reference to this case, an important question has arisen, which applies generally to criminal prosecutions in cases of poisoning. It has been asked, is it right, when an individual is suspected of the crime of poisoning, that all the substances supposed to be capable of affording evidence of the presence of poison, should be handed over to an individual selected by the prosecutor, and that the examination of such substances should be left to this individual, while the suspected party, whose life may depend on the result, has no means of adducing evidence founded on similar examinations? This question leads to a further inquiry, whether the system at present adopted, of having scientific men employed on both sides in civil as well as criminal prosecutions, and paid respectively by the plaintiff and defendant, is that most conducive to the establishment of truth? That it often tends to the disparagement of science and of scientific men, cannot be denied, and if some method could be devised for having questions in which the investigations and opinions of scientific men were required, referred to commissioners unconnected with the parties interested, without compromising the interests of either, a great benefit would undoubtedly be conferred upon the cause of science.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *7th September*, 1859,

Present—Messrs. Bird, Bottle, Brew, Cupiss, Davenport, J. B. Edwards, Hanbury, Herring, Lescher, Meggeson, Morson, and Waugh,

Mr. Joseph Sturge Southall .....Nottingham,

was elected a Member.

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued.*)

	£	s.	d.
Adams, John, Loughborough	1	1	0
Alderton, John, Hastings	1	1	0
Allen, J. H., Tottenham	1	1	0
Applegate, Edwin, Brighton	1	1	0
Argles, Robert, Clapham	1	1	0
Attwood, Alfred, 61, Cannon Street	5	5	0
Backhouse, William, Leeds	1	1	0
Baigent, William Henry, Shefford	0	10	6
Banks, Morris, and Son, Birmingham	2	2	0
Barron, Harveys, and Co., Giltspur Street	10	10	0
Baynes, James, Hull	1	1	0
Bell, William H., 48, Albany Street	1	1	0
Bell, William, Bedford	0	10	0
Bolton, Thomas, Tenterden	1	1	0
Boyce, John P., Windsor	1	1	0
Boyce and Son, Chertsey	1	1	0
Brocklehurst, James, Manchester	1	1	0
Butterfield and Clarke, York	5	5	0
Chave, John A., Uxbridge	3	3	0
Cocking, George, Ludlow	1	1	0
Condy, H. B., Battersea	5	5	0
Constance, Edward, 37, Leadenhall Street	1	1	0
Cooper, J. N., Bristol	2	2	0
Cracknell, Benjamin, 21, Belgrave Road	0	10	6
Cuff, R., Bristol	2	2	0
Cupiss, Francis, Diss	2	2	0
Dallas, Clement, 220, Regent Street	0	10	6
Deck, Arthur, Cambridge	1	1	0
Denne, J. L., Faversham	1	1	0
Dinneford and Co., New Bond Street	10	0	0
Dixon, William, Southampton	1	1	0
Dobson, John, Newcastle-on-Tyne	0	10	6
Edwards, William, Newport, Salop	0	10	6
Essery, William, Clevedon	0	10	0
Eyre, J. J., Pont Street	0	10	6
Ferris and Co., Bristol	5	0	0
Fincham, Robert, 57, Baker Street	1	1	0
Fincham, Zachariah C., 57, Baker Street	1	1	0
Fisher, William, Thirsk	0	2	6
Foster, Edward, Ludlow	1	1	0
Froud, J., Dorchester	1	0	0
Garratt, J. C. and S., Rugby	1	1	0
Giles and Son, Clifton	21	0	0
Goddard, J., Leicester	2	2	0
Godfrey, —, Jersey	0	2	6

	£	s.	d.
Goode and Son, Congleton	1	1	0
Green, James, Droitwich	0	10	0
Greenwell, Baker, 13, Queen's Terrace, St. John's Wood	1	1	0
Hackman, Leonard L., 41, Union Street	0	10	6
Harris, Thomas, Leeds	0	5	0
Heyward, Richard, Highwick	1	1	0
Highway, H., Walsall	1	1	0
Hills, Walter, Maidstone	10	10	0
Hinds, James, Coventry	0	10	6
Hodgson, Edward, Stockton-on-Tees	0	10	0
Horton, Robert, Much Wenlock	0	10	6
Howson, Thomas J., Gateshead	1	1	0
Hucklebridge, James M., 103, Upper Ebury Street	2	2	0
Hughes, Joshua P., Pontysof	0	15	0
Hughes, Evan, Clapham	1	1	0
Hugill, John, 61, Cannon Street	5	5	0
Hulme and Co., Oldham	1	1	0
Ince, Joseph, 31, Southampton Street	5	5	0
Isaac, G. W., Clifton	1	1	0
Jefferson, Peter, Leeds	0	10	6
Jefferson, Thomas, Clapham	1	1	0
Jones, Edward B., Carmarthen	1	1	0
Jones, Humphrey, Llangollen	1	1	0
Kent, Thomas, 226, Blackfriars Road	1	1	0
Knott, Thomas, Exeter	1	1	0
Lock, William, Boston	1	1	0
Mailor, J., Manchester	0	10	6
Marston, Richard, Ludlow	1	1	0
Medcalfe, Ebenezer, Lower Tooting	1	1	0
Metcalfe, Christopher L., Hull	1	1	0
Midgley, J. E., Manchester	0	2	6
Milestone, Robert, Swallow Place, Regent Street	1	1	0
Mould, Samuel, 21, Moorgate Street	2	2	0
Muskett, James, Harlestone	1	1	0
Noakes, Richard, Brighton	2	2	0
Pettifer, Edmund, Southgate Road	0	10	0
Ponting, T. C., Bristol	2	2	0
Quiller, Charles R., 15, Sloane Square	1	1	0
Radley, William V., Sheffield	1	1	0
Ramskill, Parson, Leeds	1	1	0
Randall, Alexander, Maidstone	10	10	0
Rastrick, J. L., Southsea	1	1	0
Rees, William H., Dartmouth	0	10	6
Reinhardt, George, Leeds	2	2	0
Robins, John, 372, Oxford Street	0	10	6
Sanders, H. W., Bristol	1	1	0
Savage, W. D., Brighton	1	1	0
Sawyer, James, Carlisle	1	1	0
Schacht, G. F., Clifton	2	2	0
Sharland, E. T., Bristol	2	2	0
Spencer, Charles, Gravesend	3	3	0
Stoddart, W. W., Bristol	1	1	0
Stott, William, Sowerby Bridge	0	10	6
Sturton, J., Cambridge	1	1	0
Symes, Charles, 97, Fleet Street	0	5	0
Taylor, Thomas H., Manchester	1	1	0
The Chemist and Druggist, 24, Bow Lane	5	0	0
Thomas, Richard, Burnley	1	1	0

	£	s.	d.
Thompson, C. H., Maidstone	1	0	0
Urwick, William W, 33, Denbigh Place, Pimlico	1	1	0
Vizer, Edwin B., 63, Lupus Street	1	1	0
Wallworth, David, Maldon	0	10	6
Webb, Gundry, and Fardon, Bristol	2	2	0
West, Henry J., Coventry	0	10	6
Wheeler, J. M., Portsea	0	2	6
Whitaker, William, Runcorn	1	1	0
Whitaker, Ellis, Salford	0	10	6
Whitworth, Mrs., Adelaide Road	1	1	0
Wilkes, Doctor T., Upton-on-Severn	0	10	6
Williamson, David, Guildford	2	2	0
Willsher, Stephen H., Tenterden	0	5	0
Wilson, Charles T., Swansea	5	0	0
Wilson, William, York	1	0	0
Windle, William, 48, Portman Place	2	2	0

CORRECTIONS IN SEPTEMBER LIST OF SUBSCRIPTIONS.

For	Applebury, —	*read*	Appleby, William Henry.
"	Balkwill, F. P., and Son	"	Balkwill and Sons
"	Blackmore, M., £2 2*s.*	"	Blackmore, Martin, £10 10*s.*
"	Gibbons, J. G.	"	Gibbons, T. G.
"	Kennington, A.	"	Remington, A.
"	Lewin and Cornish	"	Cornish and Lewin.
"	Mumbray, R. G., 10*s.* 6*d.*	"	Mumbray and Co., £2 2*s.*
"	Penton, C. W., £1 1*s.*	"	Penton, C. W., 10*s.* 6*d.*
"	Reddish and Co., Salford	"	Reddish and Co., Manchester.
"	Spearing, J., £1 1*s.*	"	Spearing, J., 10*s.*
"	Wilson, W.	"	Wilson, Edward.
"	Woolley, G. S.	"	Woolley, James.

Omit Buss, T., Market Harborough, £2 2*s.*

ORIGINAL AND EXTRACTED ARTICLES.

OUR EVENING MEETINGS. No. II.

BY MR. A. F. HASELDEN.

"Wisdom and friendly talk, successive, stole
Their hours away."

About two years ago I trespassed upon the space of the *Pharmaceutical Journal* by offering to its readers some observations upon the monthly evening meetings. I would venture once more, trusting to an indulgent and considerate reception, to touch upon the same subject, adding a few further remarks in connexion with the contributions to the Journal by Members and Associates of the Society.

I confess with some degree, and indeed I may say with a great degree, of reluctance and regret, that the contributions upon pharmaceutical or chemical subjects, either in the form of epistolary communications or evening papers for discussion by the Members and Associates, have not been so numerous as one could desire or would expect, considering the number of those who belong to the Society, and the vastness and extent of the field for their operations; were the subject dry and uninteresting, or the soil bare and barren, there would then be no exclamation of surprise at our apparent apathy. But it is not thus. Have we not at our disposal the entire mineral and vegetable kingdoms? It is clear that there is, or ought to be, no dearth of matter, and to me it is equally so that there is no want of ability, industry, or opportunity. How is it, then? is the question I have not unfrequently put to myself. The following replies have, amongst others, suggested themselves to my imagination:—The Pharmaceutists and Chemists, as a body, belong to the retiring and non-obtrusive order

of mankind, possessing a large amount of diffidence; and this I believe to be one widely operating cause. Again, looking at them individually, innumerable excuses—for I cannot call them reasons—appear, like so many hydra, to rise at once, confusing one's very ideas, and creating an inclination to throw up the subject after having, schoolboy like, rubbed it out more than once, in order to begin again and afresh. One says, I cannot write—at least, I have never tried, but I am sure I could not. To such I say, be sure of nothing until you have in vain made the attempt—try, write a short paper, it will receive encouragement; then a longer and longer, until you eventually arrive at the conviction, that it was only necessary to set to work in earnest in order to succeed. Another says, I might perchance write a short paper, but I feel quite satisfied that I could not read it, I never in my life stood up to read a paper upon any subject before half a dozen persons assembled together. *N'importe*, say I, try; every work must have a beginning, the worst readers are sometimes the best writers, a man who would stutter, stammer, blush, and feel shy in giving utterance *vivâ voce* to his thoughts and ideas, would probably communicate more in a short epistle than the orator who should speak for an hour, but who during the time would possibly repeat the greater portion of his matter twice or thrice; therefore upon such I would urge the point, write first and read afterwards—at any rate, send your paper, and trust to its being read; "still waters run deep," and amongst so much, surely there must be some depth.

Others there are who meet you with the following:—To write to advantage, the subject should be original; now, for my part, I have nothing original to offer, I have no faculty for devising or discovering anything new, and I am ashamed to touch upon that which has already been treated by others. As a rule, such a notion is, I am willing to believe, a fallacious one; there is scarcely any subject fit for discussion that would be investigated so thoroughly by any single individual as to leave no point untouched or incapable of improvement, and, if for the sake of experiment, several persons were simultaneously to commence writing a treatise upon any given subject, it is more than probable that each would take somewhat different view, or strike out a fresh line of operation, and although arriving at a similar conclusion, it would be by a diversified and different route. In passing through France or Belgium, one traveller would be more especially struck with the want of the green hedgerows which adorn our own country lanes and green fields; another, with the vast number of men who wear a priestly garb of greater or less degree; a third, with the general gay appearance of the young, and the early mark of age observable on the countenances of those in mid-life; a fourth, with the characteristic head-gear of the peasant girl; and another, with the repetition of the rather boastful sign of "le brave Belge," or the excellency of the Belgian machinery. An old subject in new hands, and well treated, comes upon us with a degree of freshness which is sometimes preferable to novelty ushered in with a shuffling gait; we the more readily seize upon the points of a subject of which we are already in some measure informed.

How often do we, as years roll on and holiday time returns, stand upon the sea-shore, and morn and evening watch the ebbing tide, and yet it never seems to lose its interest in our eyes, we turn to it again and again, listening to its constant fretting and ceaseless moaning with the same relish as in our earliest days. How often do we listen to the repetition of an old but well told tale with as much enjoyment as upon its first introduction; we do not the less admire the beauty and splendour of the setting sun, or its beams shining brightly upon the white far out-stretched sail, or its water absorbing rays, spreading, as it were, o'er the wide expanse of the visible ocean, because there is no novelty therein.

There is yet another motive remaining to be mentioned, which has, I fear, deterred some, both from contributing to, and attending at, the evening meetings, and it is a motive which I would rather have kept altogether out of sight, but I feel I should be omitting an important point by so doing: it was a feeling which had gained some ground, that the individual interest of the contributors, or the

general advantage of the Society, was not so much promoted thereby as that of the Editor of the Journal; this mistaken feeling of jealously has been, I trust, for ever destroyed, root and branch, by the disinterested generosity of our late President; and, in furtherance of the object of this communication, I would add his own words: "As a rule, no man can ever be a loser by having his name in print attached to a respectable article."

For the Members of Council, who are supposed to take the greatest interest in the Society, and the advancement of everything appertaining thereto, however clear it may at first appear that from their position and opportunities of acquiring information they would naturally be expected to do more for the Meetings and Journal than others, yet upon a revision of the case, and a better knowledge of circumstances, it is equally certain that they do, collectively and individually, give up much valuable time in the performance of duties connected with their office. Thus much in extenuation of those who have not hitherto been writers or contributors to the evening meetings; still, I would, with all becoming modesty but earnestness, impress upon them the importance of giving encouragement, by their presence and countenance, to those who may be willing to read, possibly their maiden papers, before the visitors, Members, and Associates of the Society—more especially as the next session will, as it were, be the commencement of a new era in its history and progress; and I would once more urge the propriety of proving individual interest in its proceedings and prosperity by individual exertion and attendance. I have every confidence that, as month succeeds month, each will bring with it its share of pharmaceutical and chemical offerings. Novelties undoubtedly will be coveted and supplied. Several subjects were brought forward at the last meeting for which there was not time for discussion: many of them, some of the pill masses in particular, are open to further consideration; but on this occasion it is not my intention to touch upon them, otherwise than as a hint thrown out.

Pepsine and its liquor, with the best mode of preparing it to ensure uniformity of strength and preservation, is, I think, still an open question; the preparation of effervescing granular salts remains a secret in the hands of the initiated; further acquaintance with the new resin of scammony may be desirable, as yet the fondly-cherished hope of a reduction in the price of the virgin through its agency has not been realized; after two centuries of a very extended use, it has as yet to be determined whether there be any useful or active principle in sarsaparilla; in glycerine and its varied combinations there is, I think, a wide field still for operations. With this I for the present conclude, as it is more easy to write a long paper than a useful one.

18, *Conduit Street*, 19*th September*, 1859.

OBSERVATIONS ON SOME PREPARATIONS OF THE PHARMACOPŒIA.

BY MR. E. B. MUSKETT.

A NEW Pharmacopœia is in course of formation; its compilers have invited the assistance of those practically acquainted with the operations of Pharmacy. Forthwith every Pharmaceutist desirous of distinguishing himself, "reads up" that unfortunate volume, the *Pharmacopœia Londinensis* for 1851, intent on discovering as many defects as possible, and of suggesting his ideas as to the best methods of making its preparations. One gentleman, who has been for many years engaged in business—he has been a Member of the Society from the commencement—discovers that syrupus cocci is pharmacopœial, imagines (for he confesses his previous ignorance of its existence) a possible defect, and suggests a somewhat extraordinary remedy. Another, after making many experiments on linimentum saponis, all tending, in his opinion, to prove the faultiness of its formula, is reminded that he has altogether misunderstood the directions of the College, and has digested, instead of macerating, the ingredients. On this latter preparation I have some remarks to make.

Linimentum Saponis.—The use of soft soap in this ought on no account to be sanctioned, for it almost always combines a portion of caustic alkali, of which it is not so easily deprived as the hard, and which is readily soluble in rectified spirit. It should always be remembered that it is an ingredient of linimentum opii, and is frequently prescribed with opium in various proportions. When soft soap is used, linimentum opii, though clear at first, soon becomes turbid, and in a day or two deposits almost the whole of the morphia in the crystalline form, thus depriving the preparation of its activity. An instance of this came recently under my own observation:—a lady had been using the liniment for some time without the desired effect, in consequence of which the strength was increased, and being used soon after its preparation, produced all the effects of poisoning with opium. I would suggest that the soap be powdered, and exposed to the air for some time, to convert any caustic alkali it might contain into carbonate, which is insoluble in rectified spirit.

Tinctura Quinæ Composita.—"Would there be any objection to facilitate the solution of the quinine by the addition of a *little* sulphuric acid?" asks Mr. Southall. In answer to this I might remark, that the addition of a little sulphuric acid does not ensure the entire solution of the quinine; but that the desired result may be readily obtained, as Mr. Hemingway has shown, by simply following the directions of the much despised P. L., and digesting, not macerating, the ingredients.

Pil. Ferri Co.—Mr. Southall's remarks on this preparation afford a curious illustration of the way the directions of the Pharmacopœia are misunderstood. The object of the College is to ensure the administration of a protosalt of iron, the method of Mr. Southall would produce principally a persalt. The Pharmacopœia process is unexceptionable; the pill so made is not spongy, does not become hard, and presents no peculiar tendency to oxidation. The secret of success is simply this: to regulate the heat according to the quantity made; it should be sufficient to fuse the mixture of myrrh and carbonate, the treacle should then be added, lastly the sulphate, and the whole beaten until the darkening of the colour shows the cessation of effervescence. Mr. S. is wrong in supposing that the evolution of gas is owing entirely to the presence of free sulphuric acid, since it takes place when perfectly neutral sulphate of iron is used.

Pilula Hydrargyri Chloridi Composita.—The formula for this would be considerably improved by replacing a fourth part of the treacle by powdered gum; when so made it forms a mass which rolls readily, retains its shape perfectly, and preserves the proper consistence for a very long period; in fact is, pharmaceutically speaking, the most perfect pill mass with which I am acquainted. His suggestion to keep it in powder is certainly objectionable, from the well-known tendency of heavy powders to subside when mixed with comparatively light ones.

Pilula Aloes Co.—The proposal to omit the extract of gentian is certainly cool. The principle of the combination being, I apprehend, the fact that, when bitter tonics and aperients are combined, both have their peculiar effects increased. (Vide Paris's *Pharmacologia.*)

Sodæ Carbonas Exsicata would form a better preparation if the first part were only followed.

Potassii Sulphuretum.—Does the College mean by this term the true sulphide of potassium, or the mixture of pentasulphide of potassium with hyposulphite of potass, formerly known under the name of hepar sulphuris? If the latter, why cause confusion by the use of a name implying a composition which it does not possess?

Potassæ Acetas.—The directions for testing this salt are not very clear. If it be digested in sulphuric acid and evaporated, it requires not merely a "high temperature," but an intense and long continued ignition to deprive it of the excess by sulphuric acid. The residue should be neutral to test paper.

Foregate, Worcester.

ON DONOVAN'S SOLUTION.

BY HARRY N. DRAPER, F.C.S.

The solution of hydriodate of arsenic and mercury, more generally known as Donovan's solution, is at present only admitted by the Dublin College, but as it is extensively employed in Ireland, it will probably be retained in the National Pharmacopœia. It may, therefore, not be superfluous to call attention to its chemical constitution and to the mode of preparing it.

The process of the Dublin Pharmacopœia is as follows:—

"Take of pure arsenic in fine powder, six grains; pure mercury, sixteen grains; pure iodine, fifty grains and a half; alcohol, half a drachm; distilled water, nine ounces, or a sufficient quantity; rub together the arsenic, mercury, iodine, and spirit, until a dry mass is obtained, and having triturated eight ounces of the water with this in successive portions, let the whole be transferred to a flask and heated until it begins to boil. When cooled and filtered, let as much distilled water be added to it as will make the bulk of the solution exactly eight fluid ounces and six drachms."

When the iodine is triturated with the metals, iodide of arsenic ($As\ I_3$) and iodide of mercury (Hg I) are formed; but upon heating the mixture with water the arsenical iodide is decomposed, arsenious acid and hydriodic acid being produced. In the hydriodic acid the iodide of mercury dissolves. The solution therefore contains, not an iodide, but an oxide of arsenic. Now it not unfrequently happens that unless the greatest care be taken to ensure the effectual combination of the iodine, on heating the mixture, instead of its becoming, as is intended, nearly colourless, a great part of the arsenic remains undissolved, and any continuance of the ebullition only vaporizes the free iodine, as may be seen by the application of starch paper. Thus, not only is its preparation troublesome, but the strength of the product itself is liable to variation.

With the view of obviating these inconveniences, I have, taking into consideration the above theory of the decomposition which takes place, constructed a formula by which a perfectly uniform solution is readily produced, having precisely the same strength as that of the Pharmacopœia. In it the iodine which would otherwise be united with the arsenic is employed in the form of hydriodic acid to dissolve the iodide of mercury.

Take of	Arsenious acid	7.92 grains
	Iodide of mercury (Hg I).....	36.24 "
	Hydriodic acid	30.49 "
	Distilled water	8 ounces 6 drachms

Introduce the whole of these into a flask, and apply heat until they are dissolved. Finally, make up the solution to its original volume with distilled water. The hydriodic acid is best prepared by decomposing a known weight of iodide of barium with sulphuric acid.

Dublin, Sept. 16th.

ON THE ABSENCE OF SUGAR IN THE URINE IN *DIABETES INSIPIDUS.*

BY R. V. TUSON,
Lecturer on Chemistry at Charing-Cross Hospital.

It has been asserted by some, but denied by others, that the urine of patients suffering from the disease formerly known as *diabetes insipidus*, but now commonly called *chronic diuresis*, contains a peculiar sugar differing from glucose in properties, but convertible into that variety of sugar by boiling with dilute sulphuric acid.

A patient having the above-named disease was admitted into Charing-Cross Hospital, under the care of Dr. Willshire, and I availed myself of the oppor-

tunity of collecting a considerable quantity of his urine for the purpose of examination.

At the time of his admission into hospital, this patient voided fifteen pints of urine daily, which had a pale straw colour, and was perfectly transparent. Its specific gravity varied from 1002 to 1006. From the very low specific gravity, one of the characteristics of the urine in *diabetes insipidus*, the presence of sugar was considered improbable. Nevertheless, as a minute quantity of sugar might exist, although not indicated by the ordinary tests when applied to the urine as passed, about six gallons of the urine were cautiously evaporated to a very small bulk and filtered. The filtered urine, both before and after boiling with dilute sulphuric acid, was most carefully and repeatedly tested for sugar. Not the slightest indication of that body was, however, obtained. A portion of the fresh urine was allowed to stand in a warm place, in order that torulæ might be developed, but none were detected.

ARSENIC IN PYRITES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In your number for September you have inserted an article, copied from the *London, Dublin, and Edinburgh Phil. Mag.*, by Professor Davy, "On the Presence of Arsenic in Artificial Manures," which has an important bearing on the question of sulphur *v.* pyrites in the manufacture of sulphuric acid, to the prejudice of the latter, too conclusively, as I will endeavour to show.

There is nothing new in the statement that plants are capable of absorbing arsenic from artificial manures, nor that the sulphuric acid used in their preparation when made from pyrites commonly contains arsenic, and hence it is common in the chemical market for buyers of superphosphate to stipulate that it shall be made with vitriol prepared from sulphur.

All pyrites, however, does not contain arsenic. Until the price of sulphur was so much advanced, which has enormously increased the demand for pyrites, the manufacturers of vitriol depended upon the United Kingdom for their supplies, and Cornwall and Wicklow furnished the chief portion, in which arsenic was invariably met with. Large importations have, however, arrived from foreign countries of a different character, and some of them contain no arsenic at all. In particular, that which has come from Belgium, exported by the "Belgian Pyrites Company of Antwerp," has been repeatedly tested for arsenic by different operative Chemists without ever showing a trace; it is nodular, with crystalline fracture and very rich in sulphur, generally testing from 48 to 50 per cent. Spain has also furnished large quantities of pyrites, which I believe also to be free from arsenic; but of this I cannot speak so positively. It would be an interesting subject of investigation at the present time, and very important as bearing upon the question discussed by Professor Davy, as to what ores of sulphur do, and what do not, contain arsenic.

The Professor states that an inferior kind of *brown* acid is manufactured for manure purposes, whereas all sulphuric acid as it comes from the chambers is brown, whether made from brimstone or pyrites. The colourless acid is produced by distillation from either, in order to concentrate it. As, however, this process increases its cost without improving its quality for many purposes, it is in some cases dispensed with, and used either as it comes from the chambers, or slightly concentrated by evaporation in open leaden pans at a low heat, and is always *brown*. The colour, therefore, is no criterion of its quality, except as to its per-centage of real acid.

Henry Scholefield.

Newcastle-on-Tyne, September 19, 1859.

BOTANICAL AND PHARMACOLOGICAL INQUIRIES AND DESIDERATA.*

BY SIR WILLIAM J. HOOKER, K.H., D.C.L., F.R.S., F.L.S., ETC.,
Director of the Royal Gardens of Kew;
ASSISTED BY DANIEL HANBURY, ESQ., F.L.S., ETC.

AFRICA—WEST COAST, ALSO EAST COAST, INCLUDING THE RED SEA AND ARABIA.

Copal.—Information is much desired respecting the varieties of this substance which are found in commerce, and which are exported from the West Coast of Africa. Some copal is believed to be dug from the ground, but one variety at least is collected from the tree. This is the Sierra Leone copal, and is produced by *Guibourtia copallifera*, Bennett, *Kobo* of the natives: specimens of this tree, including the ripe pods, are requested; it grows at Goderich and in other localities near Sierra Leone.

Grains of Paradise.—Although *Amomum Melegueta*, Roscoe, the plant which yields this drug is now well known, there are some other interesting species nearly allied, with which botanists are very imperfectly acquainted. It is, therefore, desirable to procure specimens of such plants from various parts of the West Coast of Africa. These specimens should comprise the flowers and fruits, as well as the foliage. As the flowers are very delicate, it is necessary to preserve some specimens in spirit of wine or in dilute acetic acid. Some specimens of the fruits should also be preserved in the same manner. As the species often grow intermixed, and as flowers and fruits are produced at different seasons, special care is requisite to avoid confusion.

Korarima Cardamom is the name under which the late Dr. Pereira has described an Abyssinian cardamom, having the shape and size of a small fig, which is exported from Mussowah, a port at the southern end of the Red Sea. This drug, which has long been known in medicine, is perforated at the smaller end, and, when strung upon a cord, is commonly used by the Arabs and Abyssinians as beads for their *mesbehas* or rosaries. It is said to be brought to the market of Baso, in Southern Abyssinia, from Tumhé, a country situated in about 9° N. lat. and 35° E. long. The plant, for which the name *Amomum Korarima* has been proposed, is entirely unknown.

Olibanum.—The Olibanum found in European commerce is believed to be produced partly on the African coast, near Cape Gardafui, and partly on the southern coast of Arabia, whence it is shipped to Bombay.

Olibanum is also produced in India by certain species of *Boswellia*, called *Salai* or *Saleh*, one of which is *B. glabra*, Roxb., another *B. thurifera*, Colebr. It is extremely doubtful if the Olibanum, afforded in India by these trees, finds its way to Europe, but information on this point is desired.

African Olibanum is yielded by a tree called *Plösslea floribunda*, Endl. (*Boswellia*, Royle); but as the drug varies considerably in appearance, it is highly probable that it is obtained from more than one species. The variety called *Lubân Mattee*, from its being shipped at Bunder Mattee, is, for instance, a very different drug from ordinary olibanum. A resident at Aden may be able to gather some information upon this subject, as well as upon the next.

Myrrh.—This celebrated drug is collected in great quantities by the Somali tribes on the African coast, near the southern extremity of the Red Sea, whence it is brought to Aden for shipment to Bombay. A variety of myrrh, which is probably yielded by another species, is also produced (according to Vaughan) in a district lying forty miles to the east of Aden, to which place it is brought for sale. A third variety, distinguished by the Arabs as *Bissa Böl*, is also collected by the Somali tribes, and sent by way of Aden to India. It is a point of much interest to determine with accuracy the plants which afford these several sorts of myrrh, and for this end it is earnestly requested that those who have any opportunity for investigating the subject will not neglect to do so.

ASIA MINOR, PERSIA, CENTRAL ASIA.

Gum Tragacanth is produced in Asia Minor by several species of *Astragalus*, which it is desirable further to identify. Travellers and others who have the opportunity should preserve specimens of any species *seen* to yield the gum, as well as specimens of the gum itself; noting at the same time whether the latter was

* Extracted from the *Admiralty Manual of Scientific Inquiry*. Third edition, 1859.

obtained from incision in the stem, or whether exuded spontaneously. Fine gum tragacanth is produced at Caissar (or Kaisarieh) and Yalavatz, in Asia Minor, at which places the practice of making longitudinal incisions in the stem of the shrub is adopted; the gum is also collected at Isbarta, Bourda, Angora, &c.

Gum tragacanth is frequently adulterated with another gum, which has been called *False Tragacanth*, *Hog Gum*, *Bassora Gum*, or *Gum Kutera*. At Smyrna it appears to be known as *Caraman Gum*. What is its origin? One of its properties is to swell up into an opaque mass upon being placed in water, in which, however, it does not dissolve.

Storax.—None of the Storax found in commerce in modern times is derived from *Styrax officinale*, L.; yet it is certain that this tree is capable, under favourable circumstances, of yielding a highly fragrant resin which was once much valued. Authentic specimens of this resin, which is the original and legitimate *Storax*, are much desired. It was formerly produced in the south of Asia Minor, where the tree is still found in great abundance.

Salep.—Obtain specimens of the different plants which yield salep in Asia Minor, Persia, and Cashmere, and especially of those that afford the best kinds. What is the plant which affords the drug called *Badshah Saleb*, or Royal Salep? Where is it produced, and for what purpose is it valued? It has been exported to England from Bombay.

Sumbul Root.—Nothing definite is known respecting the botanical origin of this remarkable root, which is said to come into Europe by way of Russia. It is probably produced somewhere in Central Asia.

Assafœtida.—Although the ordinary assafœtida of commerce is doubtless the produce of *Narthex Assafœtida*, Falc., there are some varieties of the drug which, it is reasonable to conclude, are derived from other species. One of those sent from India to the Great Exhibition of 1851 was a brown pellucid gum resin, containing pieces of the stalk of the plant, and differing considerably from ordinary assafœtida.

Another variety, which has long been known, has been called *Stony Assafœtida*, from its containing about 50 per cent. of gypsum, an addition which, in the case of so cheap a drug, it is difficult to understand. Assafœtida is produced in Persia, and reaches Europe by way of Bombay.

Sagapenum, a gum-resin resembling assafœtida, but not acquiring a pink colour upon exposure to the air, and of not so strong an alliaceous odour. As it is occasionally shipped from Bombay, it is presumed that it is produced in Persia. Though it has been used in medicine for ages, its botanical origin is not ascertained; from analogy, however, we may infer that it is the produce of some large plant of the nat. order *Umbelliferæ*. Compared with assafœtida and galbanum, sagapenum is a rare and costly drug.

Galbanum.—The remarks we have made upon sagapenum apply to a great extent to the gum-resin known as *Galbanum*. Galbanum is, however, a far more abundant substance than sagapenum. It occurs in trade in two varieties, which are so distinct as to lead to the inference that they are yielded by distinct plants. Galbanum is said to be imported into Russia in large quantities by way of Astrachan, but that which reaches England comes principally from Bombay.

Opopanax, another fœtid gum-resin, the produce, according to most authorities, of *Opopanax Chironium*, Koch, a large umbelliferous plant, native of the south of Europe, and of Asia Minor. There is no modern account of the collection of this drug, nor is its place of production ascertained.

Rhubarb.—Determine the true source of the various sorts of *medicinal* rhubarb, especially of the Chinese rhubarb sold at Kiachta to the Russians, and of that exported from Canton. Strange to say, we are still in the dark respecting the real origin of this most valuable drug! In this and all such cases the drug should be procured by one who is an eye-witness to it being gathered, and specimens of the foliage, flowers, and fruit, carefully dried for the herbarium on the spot, should accompany it.

India, Siam, Indian Archipelago, China, &c.

Catechu.—Observe the processes by which the various kinds of *Catechu*, *Cutch*, *Terra Japonica*, and *Gambir* are obtained; and if from trees, whether from others besides *Acacia Catechu*, *Areca Catechu*, and *Uncaria Gambir*. We wish to identify the trees with the respective extracts.

Grass Oils.—The grasses used in India for affording the fragrant essential oils

known as *Lemon-grass Oil* or *Essence of Verbena*, *Ginger-grass Oil*, *Citronelle*, &c., require investigation. What, for instance, is the source of the essential oil imported from Ceylon as *Oil of Lemon-grass?* It is considered quite distinct from *Citronelle*, which is also a production of the island.

Benzoin or *Gum Benjamin.*—Obtain complete specimens of the tree which affords this drug in Siam.

Cardamoms.—The so-called *Wild* or *Bastard Cardamom* of Siam is produced by *Amomum xanthioides*, Wallich, a plant of which *complete* and *well-preserved* specimens are requested, in order that it may be described and figured. The seeds *per se* have been imported into England, while the empty capsules are found in the drug-shops of China. Are the latter exported from Siam to China?

What is the origin of the cardamom called by the Chinese *Yang-chun-sha*, the *Hairy China Cardamom* of pharmacologists? It is said to be produced in the province of Kwang-tung, and it may be a native of Cochin China.

Nothing is known of the origin of the scitamineous fruit to which the name *Large Round China Cardamom* has been given, and which is known to the Chinese as *Tsaou-kow*. The same remark applies to the *Bitter-seeded Cardamom*, *Yĭh-che-tsze*, and *Ovoid China Cardamom*, *Tsaou-kwo* or *Quâ-leu*; it is probable that all of them are productions of the south of China, or of Cochin China.

Cassia Bark.—Specimens are much desired of the tree which affords this bark in Java, on the Malabar coast, in the south of China, and in Cochin China. Botanical specimens should in all instances include good samples of the bark, young and old, obtained from the same tree.

Cassia Buds.—These are the immature fruits of a *Cinnamomum*, native of Cochin China, specimens of which are requested.

An inferior kind of Cassia Buds, known as *Lovengoopoo*, is found at Madras. What is the species that affords it?

Aromatic Barks of other *Laurineæ*, as *Culitlawang*, *Massoy*, *Sintoc*, are objects of commerce in the Indian Archipelago, and are but imperfectly known in Europe. The traveller should embrace the opportunity, when it occurs, of seeing the bark collected, and of obtaining authentic specimens of it, and of the tree yielding it. Massoy Bark is produced on the west coast of New Guinea.

Galangal Root.—Endeavour to procure the plant affording this drug, which is imported from the south of China.

Elemi.—This resin is abundantly produced in the forests of the Philippines, where it often assists in giving a cheerful blaze to the fire of the traveller. It is also exported from Manilla as a drug. The tree that affords it is probably a *Canarium*, but it is desirable to have complete specimens, in order to ascertain the species with exactness. Elemi is also produced in Mexico, where it is known as *Copal*. It occurs in commerce in scraped pieces, which are semi-cylindrical, yellowish, semi-opaque, and having the usual strong and fragrant odour of Elemi. This drug is the produce of *Elaphrium elemiferum*, Royle, a tree occurring near Oaxaca, of which specimens are requested in order that it may be further examined and described. There are other resins, of whose origin little is known, which have been imported from Mexico, Brazil, and other parts of tropical America as *Elemi*.

Central and South America.

Sarsaparilla.—The species of *Smilax*, the roots of which constitute the various sorts of sarsaparilla found in commerce, are very imperfectly known. Good botanical specimens, comprising flowers, fruits, and leaves, and accompanied by the stem and roots, should be carefully preserved, and transmitted to England for determination. The so-called *Jamaica Sarsaparilla* grows near the Chiriqui Lagoon, in the state of Costa Rica, and a species very similar, if not identical with it, at Bajorque, on the Rio Magdalena, New Granada. Other sorts of sarsaparilla are produced in Mexico, Guatemala, Honduras, Brazil, &c. That of Guatemala grows in the department of Sacatepequez in that state.

Rhatany Root.—A variety of this drug has been exported of late years from Savanilla, in New Granada. Obtain specimens of the plant from which it is derived.

Malambo Bark, a highly aromatic bark, produced in New Granada. Of its origin nothing certain is known.

Balsam of Copaiva is imported from several parts of Brazil; it varies somewhat in properties, and is the produce of several species of the genus *Copaifera*. It is desirable to obtain the balsam of each species, with a specimen in flower and leaf,

and, if possible, in fruit, of the tree affording it, and the name of the district where the tree grows, and its native appellation there.

Lignaloe.—The name of a remarkably aromatic wood sent to the Paris Exhibition of 1855, from the department of Vera Cruz, in Mexico. By what tree is it afforded?

Lignum nephriticum.—This rare wood was sent to the Paris Exhibition of 1855 from Mexico. To what tree is it to be referred?

Cinchona Bark, or *Peruvian Bark.*—This valuable drug, the only source of quinine, is derived from various species of *Cinchona* growing along the whole chain of the Andes, from New Granada to Bolivia. Of these trees it may be said that good, pressed, botanical specimens of *any* species are interesting and desirable. Such specimens ought to include the flowers and fruits, and in every case to be accompanied by several pieces of the bark, young and old, stripped from the *very* tree from which the botanical specimens were gathered: all being most carefully and clearly labelled upon the spot with every particular worthy of note.

A point of considerable interest, still to be determined, is the *proportion* of alkaloids contained in the *young* and *old* bark. For this determination two or three pounds of each sort of bark are requisite; and for a perfectly fair experiment they ought to be collected from the same individual tree.

The attention of Englishmen residing in the countries indicated is especially requested to this by no means unimportant question.

Balsam of Peru.—The drug known under this designation is produced, not in Peru, but in Central America, in a district lying between Acajutla and Port Libertad, in the western part of the state of San Salvador, known as the *Balsam Coast.* The tree which affords it may also be found at Ispanguasate (where it has been planted), and near Chiquimulilla, and on the coast of Suchultepeques. Of this tree, which is the *Myrospermum Pereiræ* of Royle, good flowering specimens are much desired, as are also fresh seeds, in order that the plant may be raised in our hot-houses. The seeds should be transmitted by post, as their vitality is not long retained. The balsam which is called *Balsamo negro*, is brought for sale to Sonsonate, previously to shipment at Acajutla.

Although the plant above mentioned is undoubtedly that which affords the balsam of Peru of commerce, yet there is reason to think that a balsam of similar character was formerly extracted from other species. Monardes (1565) states that balsam of Peru is *lighter* than water, but the balsam of modern times is *heavier.* Inquire into this. Is not balsam prepared at Chongon, near Guayaquil? Is any produced in Mexico? We have received the seeds of a *Myrospermum* from that country.

Balsam of Tolu.—*Myroxylon Toluifera*, H. B. K., the tree which affords this substance, is very imperfectly known. It grows in New Granada, in the neighbourhood of Turbaco, and especially in the high savannas near Tolu, Corozol, and the town of Tacasuan. It is also found at the mouth of the river Sinu, near El Zapote, and here and there on the banks of the Rio Magdalena, in the environs of Garapatas and Mompox.

Is it not possible to obtain at least the seeds, not to mention a supply of good botanical specimens, of this famous tree, and some account of the extraction of, and trade in, the balsam it affords?

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On Preserving Plants for the Herbarium.

This is by no means the difficult process which many have imagined. The object is to prepare the specimens in such a manner that their moisture may be *quickly absorbed*, the colours, so far as possible, preserved, and such a degree of pressure imparted that they may not shrivel in drying.

For these purposes, provide a quantity of paper of moderate folio size and rather absorbent quality—brown or stout grey paper answers the purpose exceedingly well. An excellent kind, when not to be used in a hot and moist country, is *Bentall's botanical paper*, 16 inches by 10, which costs (folded) 15*s.* a ream; or of larger size, namely, 20 inches by 12, 21*s.* per ream. It is sold by Newman, No. 9, Devonshire Street, Bishopsgate Street, London. In a hot and moist region, brown paper may be employed with advantage. Two boards are requisite, of the same size as the paper, or a trifle larger, one for the top, the other for the bottom, of the mass of papers. Some pieces of millboard placed between the specimens, if these are numerous or particularly thick and woody, are very useful. For pressure nothing is better than a heavy weight on the topmost board, or, while travelling, three leathern straps and

buckles, two to bind the boards transversely, and one longitudinally. Thus provided, gather your specimens, if the plant be small, root and stem; if large, take off portions of the branches, a foot or rather more in length, always selecting those which are slender and in flower, or in a more or less advanced state of fruit. Long slender plants, as *grasses*, *sedges*, and many *ferns*, may be doubled once or twice. Place them, as quickly after being gathered as you can, side by side, but never one upon the other, on the same sheet of paper, taking care that one part of the bundle be not materially thicker than the other; and lay over the specimens one, two, three, or more sheets of paper, according to the thickness of your paper and of your plants; and so on, layer above layer of paper and specimens, and subject the whole to pressure. In a day or two, according to the more or less succulent nature of the plants and the heat and dryness of the climate, remove them into fresh papers, twice or oftener, till the moisture be absorbed, and dry the spare papers in the sun or by a fire for future use.

If the specimens cannot be laid down as soon as gathered, they should be deposited in a tin box, which indeed is essential to the botanist when travelling; there they will remain uninjured for a day and night, supposing the box to be well filled and securely closed, to prevent evaporation. Some very succulent plants, and others with fine but rigid leaves—the heath and pine tribe, for example—require to be plunged for an instant into boiling water ere they are pressed. In this case the superabundant moisture must be absorbed by a cloth or by blotting-paper.

When sufficiently dry the specimens should be put into dry papers, one sheet or folio between each; except they are unusually woody (which is the case with oaks and pines), and then more paper must be employed, care being used to distribute the specimens pretty equally over the sheets, and thus a great many may be safely stowed in a small compass. A slip of paper should be placed with each specimen, stating its name, if known, and the date and place of collection. Specimens so arranged are now ready for transport, either packed in boxes or covered with oil-cloth.

Mosses and cryptogamous plants may be generally dried in the common way: those which grow in tufts should be separated by the hand to form neat specimens. Seaweeds require a slight washing in fresh water, and common blotting-paper is the best for removing the moisture from this tribe of plants.

It is almost needless to add that *all plants*, whether living or dried, ought to be transmitted to Europe with the least possible delay; the latter, especially in hot or moist climates, are often soon destroyed by the depredations of insects.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On Cellulose and the Composition of Wood.—A highly important discussion has been recently carried on in the French Academy, involving some valuable investigations into the chemical nature and composition of the proximate principles of vegetable tissues. The discovery by M. Schweitzer of the solubility of cellulose in cuprate of ammonia, first suggested the means of further inquiry into the nature of the material of which the vegetable cells are constructed. It was early ascertained by M. Cramer, M. Payen, and others, that, while this cupric solution immediately dissolved the cellular tissue of cotton and many other substances, it exerted no action upon the cellular membranes of several algæ, champignons, the pith of trees, cork, &c.

M. Payen, in a paper on the analogies and points of distinction between cellulose and starch, accounted for this difference by attributing it to the protecting action of the intercellular matter, the incrustations of mineral, fatty, and nitrogenous substances, and the presence of the epidermis. He found, if all these foreign substances were removed, and the cellulose left in a state of purity, it was immediately dissolved; and that when again precipitated by acids it had all the properties and the composition of ordinary cellulose.

M. Fremy, in a paper on the composition of vegetable cells,* showed, by means

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* Noticed in the "Report" of the *Pharmaceutical Journal* for August, page 115.

of the new reagent, that the inner walls of the cells of fruits, &c., consist, not of cellulose, but of a substance which he named *Pectose*, and which, under comparatively slight influences, and during the ripening of fruit, is rendered soluble and converted into *Pectine*. In the course of this paper M. Fremy expressed an opinion that cellulose exists in several isomeric conditions, in one of which it is soluble in cuprate of ammonia, while in the other it is insoluble. This view, opposed to M. Payen's, was more fully developed in a subsequent communication, entitled "Distinctive Characters of Ligneous Fibres, Cortical Fibres, and the Cellular Tissue which constitutes the Pith of Trees." Up to that time the utricular tissues and vegetable fibres were considered to be formed essentially of the same substance, cellulose. M. Fremy argued, while the cupro-ammoniacal reagent immediately dissolves the cortical fibres of all plants and the utricular tissues of fruits, but exerts no action upon the pith of trees, it is difficult to consider these tissues as being formed of the same substance—the difference cannot be attributed to unequal penetration by the reagent, because the pith is much more porous than the mass of cortical fibres; the impurity of the insoluble body cannot explain the difference in action either, because the pith, properly selected, presents all the characters of a pure immediate principle, containing but inappreciable quantities of mineral substances. These chemical characters, therefore, establish a striking difference between the cellular tissue of pith and cortical fibres. The wood or fibrous tissue is also insoluble, when purified as far as possible from incrusting substances, and also even when examined in the young condition. It therefore appears that the ligneous fibres are quite distinct from the cortical fibres, the latter being soluble in cuprate of ammonia, while the former are insoluble. That this distinction cannot be accounted for by the greater hardness of the woody tissue may be inferred from the fact, that the cupro-ammoniacal liquor is capable of readily dissolving the albumen of the *Phytelephas*, or vegetable ivory, which presents much greater hardness and less porosity than the ligneous fibres. M. Fremy sought to ascertain what the conditions are by which the insoluble tissues may be rendered soluble. He found that rice paper, which is insoluble in the reagent, when submitted to the action of diluted mineral acids, is converted into a membrane which is soluble; alkalies also effect the same result, but more slowly. Acetic acid, even boiling, is incapable of producing any change. The ligneous fibres and pith are thus modified and converted into the soluble condition; the tissue of champignons, however, withstand the action of acids, and remain insoluble. From these facts, M. Fremy concluded that M. Payen, in his endeavour to perfectly purify the tissues, employed agents which were capable of modifying the principle itself.

M. Payen has also brought forward several experiments tending to support his own view, and contends that there are not sufficient grounds for considering that the insolubility of certain membranes in the cupric reagent is due to the existence of several isomeric conditions of cellulose. He states that in all cases the cellulose, when freed perfectly from foreign matters, is soluble in the reagent, and that the means employed in the purification are not sufficient to effect any isomeric modification. The cellular tissue of pith, he states, although containing no incrusting substance, is nevertheless impregnated with certain bases, principally lime, which exist partly in combination with silica and partly with the organic matter. These are so uniformly distributed, that after the complete incineration of the organic matter, a white skeleton remains, consisting principally of carbonate of lime, of which the weight amounts to 6-100ths of the dried pith, and which, examined under the microscope, still retain the form of the tissue. The cells of the pith are, in fact, formed of cellulose, freed from organic incrustations, but their interior walls are coated with a thin layer of nitrogenous matter containing traces of fat and foreign bodies, which oppose the penetration and solvent action of the cupric reagent. To remove these impurities, the pith was cut into slices and immersed in the copper solution, by which the cells were coloured and swollen, but not dissolved. The slices were then removed, and immersed in cold water, acidulated with hydrochloric acid, which slowly dissolved the lime, &c.; they were then washed with pure water, and upon again treating with the cuprate of ammonia, they readily dissolved.

M. Fremy considers that in these experiments of M. Payen, the action of the hydrochloric acid and the means employed to remove the impurities are sufficient to effect a modification of the insoluble cellulose. He points out, that tissue as dense as vegetable ivory, or impure as the ordinary cortical fibres, is readily attacked by the cupric solution. He has also shown that the tissue of pith may be rendered

soluble by simply exposing it to a temperature of 150° Cent., or by boiling it in water for twenty-four hours, in both of which cases the mineral matter remains unaffected, the organic substance alone undergoing alteration. The tissue, thus modified and rendered soluble, furnishes upon calcination the same amount of inorganic matter, which retains the original form of the tissue, as the original and insoluble pith.

M. Payen again brings forward the following experiments:—In order to destroy the obstacles to solution which might result from the want of contact and wetting, owing to the interposition of air, the pith was submitted to a simple grinding in cold water, by which means 45-100ths of the total weight was rendered soluble; this proportion was further increased to 75-100ths by previously drying the tissue at 110° Cent. in a vacuum. In another case, the pith was immersed in water, and maintained in a vacuum for some time; the tissue, thus gorged with liquid, was then frozen: when afterwards thawed and agitated with the reagent, it immediately commenced to dissolve. In this way 56 per cent. of the tissue was brought into solution; the insoluble portion contained 15.5 per cent. of inorganic matter. The insoluble part in this experiment, and in the preceding, was washed with ammoniacal water, to remove as far as possible the oxide of copper. In a third experiment, the pith was simply cut into extremely thin laminæ, not exceeding from one to three millimetres in thickness, and agitated in the copper solution. In the course of an hour it commenced to dissolve, and 51 per cent. of the tissue was obtained in solution. M. Payen is prepared to admit that very great differences exist between different kinds of cellular tissue, and that the properties of the cellulose will constantly vary with the age, the thickness of the cell walls, the amount and the kind of incrusting matter, and the associated inorganic constituents; but that difference in the action of a single solvent, such as cuprate of ammonia, is totally insufficient to establish the existence of a distinct, although isomeric, species of cellulose.

M. Fremy, in his memoir on the composition of wood, instead of assuming, as physiologists have hitherto done, that the various tissues of the plant are formed on a basis of cellulose, which is variously associated and impregnated with foreign substances, considers that each tissue presents a particular chemical composition, and special properties depending in some manner on the peculiar physiological part which it supports in vegetation. He has already shown that the vegetable tissues contain a principle, *Pectose* (which has not been disputed), and which has been confounded with cellulose in microscopic observations. His analyses and examination of the *cuticle* also indicate that it possesses a distinct and peculiar composition. In this paper M. Fremy only recognizes under the name of *cellulose* that substance which is immediately dissolved by cuprate of ammonia, and which constitutes cotton, cortical fibres, or the perisperm of the *Phytelephas*. The substance which constitutes the pith of trees, and which is insoluble in the copper solution, he names *Para-cellulose*. Knowing that experiments made upon a mixture of different organic tissues might lead to grave errors, M. Fremy sought to isolate the different organs of which wood is constituted, and submit them to separate examination. Botanists consider wood as formed of fibro-vascular bundles, separated one from the other with cellular tissue, divided by rays running from the pith to the centre. In certain parts of this ligneous mass are found masses of fibre unrolled and annular or punctated vessels. To obtain the ligneous vessels in a state of purity, entirely free from fibrous or utricular substance, the wood was treated first with dilute potash, which removed the tannin, albuminous and pectic matters. It was then submitted to the action of hydrochloric acid, commencing with dilute, and gradually changing it for stronger, until the fuming acid was employed. By this means the utricular tissue was partly dissolved, and the ligneous fibres rendered soluble in the cupric reagent. In the last place, this tissue is treated with cold concentrated sulphuric acid, then washed with water, alcohol, and ether. In this way the ligneous vessels are obtained perfectly pure. The substance of which these vessels are formed M. Fremy distinguishes by the name of *vasculose*. It is characterized by its insolubility in hydrochloric acid, concentrated sulphuric acid, and cuprate of ammonia. It is dissolved, on the contrary, by potash, concentrated and boiling.

The utricular substance, which forms the medullary rays, is identical with the pith. It is, like it, insoluble in the cupric reagent, but rendered soluble by the action of acids, of alkalies, or of heat. It consists of *Para-cellulose*. The concentrated and boiling potash, which dissolves the ligneous vessels, can also dissolve the medullary rays; this solubility affords the means of isolating the third organ of the woody

tissue: the ligneous fibres. Chippings of wood are treated in a glass flask with potash sufficiently strong and hot to effect the disorganisation of the wood. It is important not to go beyond that point, as the ligneous fibres themselves may be altered. The insoluble portion is afterwards removed, and washed with water, alcohol, and ether. It consists of ligneous fibres, perfectly white and in a state of purity. Oak and deal were the woods employed by M. Fremy. The substance forming these ligneous fibres is named *Fibrose;* it is characterized by its insolubility in the alkaline solutions, which dissolves the vessels and the medullary rays; by its solubility in sulphuric acid, which does not dissolve the ligneous vessels ; by its insolubility in the cupric reagent, which immediately dissolves the cellulose, but does not attack the ligneous fibres until they are modified by chemical agents. Fibrose and cellulose may be also distinguished by the action of sulphuric acid, which immediately dissolves cellulose, converting it into dextrine, which is not reprecipitated by water. Fibrose submitted to the action of strong sulphuric acid, dissolves like cellulose, but, on immediately adding water to the acid solution, it is reprecipitated in the form of a thick transparent jelly.

Action of Chloride of Sulphur on the Acetates.—M. Schlagdenhauffen has shown that chloride of sulphur is capable of reacting most energetically on the acetates, giving rise to considerable elevation of temperature, and the production of anhydrous acetic acid, sulphurous acid, and a mixture of the chloride, sulphide, and sulphate of the base present.

108 grammes of chloride of sulphur were poured in small portions at a time upon 164 grammes of fused acetate of soda, the elevation of temperature which took place at the commencement of the reaction, occasioned the volatilization of a portion of the chloride; towards the end of the operation the heat subsided, and the mass was well mixed with a spatula. The mixture was then heated in a retort, when a portion of chloride of sulphur passed over unchanged, but, after further digestion, a perfectly clear, colourless liquid, with a powerful penetrating odour, was obtained; while, at the same time, a considerable quantity of sulphurous acid was disengaged. At this point the operation was stopped, and the distilled liquid submitted to rectification; at 138° Cent. it commenced to boil, and the portion which passed over between 136° and 139° C. was collected apart. This product was heavier than water, falling to the bottom without dissolving ; its solution was effected, however, by long standing, and also by a slight augmentation of temperature. Treated with potassium, a lively reaction resulted; the product so obtained, mixed with water and a salt of silver, lead, or mercury, added, gave no precipitation or coloration. The specific gravity of this liquid was 1.075. Its elementary composition corresponded to the formula $C_4 H_3 O_3$. It was, therefore, proved to be anhydrous acetic acid. When the operation, instead of being arrested at the point indicated, was continued further, and a stronger heat applied, acetone, oxide of carbon, a yellow liquid of a suffocating odour, and free sulphur occurred among the volatile products, while the residue in the retort only consisted of sulphate of soda, and chloride and sulphide of sodium. The decomposition is the same when perfectly anhydrous acetate of lead is employed in the place of acetate of soda.

Combination of Sesquioxides with Sesquichlorides.—It is well known that constitutionally neutral sesquichloride of iron is capable of dissolving considerable quantities of recently precipitated gelatinous peroxide of iron, forming a deeply coloured solution, which possesses very considerable stability. M. Bechamp has recently published the results of some experiments on the extent of this solvent action, and the nature and composition of the bodies formed.

He states that when freshly prepared moist oxide of iron is digested, in the cold, in solution of neutral sesquichloride of iron, a deep red liquid is obtained containing an oxychloride, which may vary in composition from $Fe_2 Cl_2 + 5 Fe_2 O_3$ to $Fe_2 Cl_3 + 12 Fe_2 O_3$. He considers that these two terms are definite, and may be produced at will; the first, containing five atoms of oxide to one of chloride, being formed immediately upon the addition of the oxide; while the last requires at least 15 days' digestion. Mr. Phillips has described a compound which he represented by the formula $Fe_2 Cl_3 + 13 Fe_2 O_3$; and M. Ordway obtained one to which he assigned the formula $Fe_2 Cl_3 + 23 Fe_2 O_3$. All these compounds are soluble in water; the solutions of those containing from five to ten atoms of oxide may be evaporated to dryness without destroying the solubility of the body, but the oxychlorides containing 12 atoms and more of oxide do not again dissolve after being once dried.

A cold solution of sesquichloride of iron, *properly diluted*, slowly dissolves considerable quantities of moist *oxide of chromium*. In M. Bechamp's experiment, after three months' digestion, the solution analyzed, contained a compound which may be expressed by the formula $Fe_2 Cl_3 + 4 Cr_2 O_3$. The solution was olive green; no trace of ferric oxide was precipitated.

Sesquichloride of iron is incapable of dissolving gelatinous alumina, on the contrary, when digested together, even in the cold, the oxide of iron is slowly precipitated. Reciprocally, sesquichloride of aluminium cannot dissolve oxide of iron.

Solution of green *sesquichloride of chromium* is also capable of slowly dissolving recently prepared moist oxide of *chromium*, forming a compound $Cr_2 Cl_3 + 3 Cr_2 O_3$; the solution is of a peculiar bluish green colour. Sesquichloride of chromium dissolves the moist *oxide of iron* much more rapidly; after three months digestion the solution contains a compound $2 (Cr_2 Cl_3) + 15 Fe_2 O_3$. This liquid is of a deep red colour, the green of the chromium compound being completely masked. Sesquibromide of iron also dissolves the oxide.

When gelatinous hydrate of magnesia, oxide of zinc, or protoxide of copper is added to a solution of neutral sesquichloride of iron, the insoluble hydrate is at first rapidly dissolved, without any precipitation of ferric oxide, until a point arises when its solution ceases, and the oxide of iron is thrown down. Also when caustic potash or ammonia is slowly added to the ferric chloride, the oxide which is first precipitated again dissolves up to a certain point. The author has ascertained that the limit of this solubility may be represented by the following equation:—

$$6 Fe_2 Cl_3 + 15 MO = 15 M, Cl + (Fe_2 Cl_3, 5 Fe_2 O_3).$$

Thus, the base MO continues to dissolve without producing any permanent precipitation, until the oxychloride containing five atoms of oxide is formed—the same which is obtained directly by dissolving the moist oxide in the chloride. It is impossible in this experiment to form a higher oxychloride than the one above, in consequence of the chloride M, Cl, which is simultaneously produced. In fact, if into a solution containing $15 Zn Cl + (Fe_2 Cl_3, 5 Fe_2 O_3)$ or $15 Mg Cl + (Fe_2 Cl_3, 5 Fe_2 O_3)$ is poured, in the one case, a saturated solution of chloride of zinc, or in the other, of chloride of magnesium, a precipitate is thrown down, and, on filtration, the liquid passes through quite colourless, and containing not a trace of iron. It is this remarkable action which limits the composition of the oxychloride formed.

The compounds containing 10 and 12 atoms of oxide are also completely precipitated from their solutions by saturated solutions of the sulphates, nitrates, and chlorides of potash, soda, magnesia, and several other bodies.

A new Disinfectant for Dressing Putrid Sores and Ulcers.—Considerable discussion has recently taken place in the French Academy respecting a new preparation, introduced by MM. Demeaux and Corne, for dressing and disinfecting putrid sores and ulcers. It consists of a mixture of 100 parts of commercial plaster of Paris in very fine powder, and from one to three parts of coal tar. This mixture forms a powder of a more or less greyish colour, and a slightly bituminous odour. For application, it may also be made into a paste with olive oil, which binds the powder together without destroying its absorptive power. The following are the properties of this substance, as described by the above gentlemen:—A gangrenous sore, with an abundant fetid suppuration, treated with this dressing is immediately freed from all disagreeable odour, and the bandages, even after 24 or 36 hours, exhale no more odour than if taken from a simple fracture. An ulcerated cancer producing a fetid serous suppuration, dressed with this substance is entirely deprived of odour as long as the dressing remains on. So also the linen saturated with pus, cataplasms impregnated with the suppuration, &c., placed in contact with this substance lose all their disagreeable odour; the infectious liquid produced by gangrene, clots of decomposed blood, tissues in a state of advanced putrefaction, treated with this substance are immediately disinfected. Its action appears to be to arrest the work of decomposition; it removes the insects, and prevents the production of maggots. The consistence acquired, either by the powder alone or the paste with oil, does not cause the least pain to the patient, or harm to the sore. Its application may be indirect or direct, the latter produces no harm, but rather exercises a detersive action favourable to cicatrization. This dressing has the double power of disinfecting the pus and other morbid products, and of absorbing them; the last circumstance is of the greatest importance, because it enables the use of lint to be dispensed with. Fifty kilogrammes of this powder may be made in Paris for one franc. M. Velpeau,

at the Hôpital de la Charité, and several other French Surgeons have employed this preparation with great success, and speak very highly of its disinfecting properties. Mr. Crace Calvert, of Manchester, has addressed a letter to the French Academy, in reference to this subject, pointing out the great variation which exists in the composition of coal tar, and the consequent necessity for more accurately ascertaining to which of the constituents the disinfecting properties are really due, in order to ensure the uniform action of the preparation. From the results of his own experiments he considers that the antiseptic properties of the tar are entirely due to the carbolic acid present. He states, that a corpse injected with a weak solution of this acid, was preserved from decomposition for several weeks; and that a piece of flesh steeped in carbolic acid, was exposed to the weather for three years without change. He also states, that a small quantity added to urine will preserve it from decomposition for some weeks; and that it is also capable of preventing the gallic fermentation from taking place in the solutions of tanning substances.

SOME FACTS IN RELATION TO THE SOLUBILITY OF PHOSPHATE OF IRON.

BY JOHN M. MAISCH.

TO THE EDITOR OF THE AMERICAN JOURNAL OF PHARMACY.

Dear Sir,—In vol. xxix., page 404, you have given a formula for the preparation of a syrup of pyrophosphate of iron, in accordance with the recommendation of E. Robiquet, by dissolving this ferruginous salt by means of a solution of citrate of ammonia. I have repeatedly prepared it in the way there indicated, but within a few days I have come to the conclusion that the preparation of the pyrophosphatic salt is entirely unnecessary for the purpose.

If a solution of citrate of sesquioxide of iron is mixed with an alkali, no precipitation takes place, since the newly-formed double salt is easily soluble in water; the same behaviour as the alkalies, has a solution of pyrophosphate of ammonia, and also the ordinary phosphate; no precipitate of phosphate of iron occurs.

A solution of sesquichloride of iron, after being mixed with a solution of citrate of ammonia, is likewise not precipitated by the ordinary phosphate of ammonia, or of soda; but the phosphate of potassa produces a precipitate immediately. If, however, a sufficient quantity of phosphate of ammonia had been previously added, the further addition of the potassa phosphate will not disturb the clear solution.

I inferred from these experiments, that not only pyrophosphate, but also the other phosphates of iron, will enter into a permanently clear solution with citrate of ammonia; in accordance with this inference, I prepared some ordinary phosphate of the sesquioxide of iron, and found it in its recent state entirely soluble in the ammoniacal citrate. It would appear, therefore, an easy matter for a physician to give phosphate of iron in solution by simply ordering citrate of iron and phosphate of ammonia; the solution, no doubt, will contain the citrate and phosphate of both bases.

My time being so much occupied, I have not had time to make any more experiments at present, and the few above related are not calculated to answer the question, whether or not a soluble double phosphate of ammonia and sesquioxide of iron may exist, or whether Robiquet's syrup of pyrophosphate of iron is merely a solution of an insoluble phosphate in citrate of ammonia.

I remain, yours very respectfully,

Philadelphia, August 10th, 1859. John M. Maisch.

[Note.—The employment of citrate of ammonia as a solvent for pyrophosphate of iron originated, we believe, with M. Robiquet, who suggested it as a better agent than the pyrophosphate of soda for that purpose; and at pages 401-4 of this Journal for 1857 his process will be found noticed. Subsequently (January, 1858) J. G. Richardson, of Philadelphia, in a new process for Compound Syrup of the Phosphates, uses citrate of ammonia as a solvent for pyrophosphate of iron, which he introduces into that preparation in lieu of the ordinary phosphate, and at the same time effects the solution of the phosphate of lime by *free citric acid*. Joseph Roberts, of Baltimore (see *Maryland Journal of Pharmacy*, March 4th, 1858) suggests a syrup in which acid phosphate of ammonia is the solvent of phosphate of iron, and which he considers a permanent preparation. In Mr. Maisch's letter a step further

is taken; he ascertains that citrate of ammonia will dissolve and retain the ordinary phosphate of iron in solution, and that in presence of citrate of ammonia the oxide of iron cannot be precipitated from the sesquichloride of iron in solution. The latter observation has been made before by Rose (see Gmelin's *Hand.*, xi., 447), so far as citric acid in a free state is concerned.

In a paper, which has reached us since the above was written, by Mr. A. F. Haselden, on names in connexion with Pharmacopœial usage (*Pharmaceutical Journal*, August, 1859), we find the following:—Alluding to "syrup of phosphate of iron, sometimes called syrup of superphosphate of iron, and sometimes syrup of phosphate of iron, I have no doubt that generally the same preparation is looked for; but in the first, if prepared as the name would imply, an opaque syrup of an insoluble compound is the result; in the last two, an excess of acid to the phosphate enables the operator to produce a clear preparation, but this is uncertain in its strength and unstable in its nature. In order to meet this difficulty, the General Apothecaries' Company have introduced a preparation by the assistance or addition of *citrate of ammonia to the phosphate of iron*, and thus a preparation in scales is obtained like the ammonia-citrate of iron, which still sails under the name of the *pyrophosphate* of iron, and with which a light brown or dark straw-coloured syrup is prepared, bearing the title of syrup of pyrophosphate of iron."

From this it appears that Mr. Maisch is anticipated in regard to citrate of ammonia dissolving phosphate of iron. By trial we have ascertained that citric acid in a free state is a perfect solvent for recently-precipitated phosphate of iron, and the addition of an alkali afterwards does not precipitate the phosphate. This naturally suggested a trial with the blue commercial ferroso-ferric phosphate. When equal parts of citric acid and of this blue phosphate are triturated with four parts of water, and allowed to stand several hours with occasional agitation, the blue colour gradually disappears, the phosphate is dissolved, and forms a greenish-brown solution, which on dilution is not precipitated, nor does ammonia or potash throw down the phosphate, which would indicate the formation of a double salt.

As suggested by Mr. Maisch, these facts render the prescribing of phosphate of iron in solution extremely simple, and physicians can extemporaneously vary the proportion of the phosphate to suit their views of particular cases, as a few examples will explain, viz.:—

Take of Phosphate of Soda, ℥iij.
Sulphate of Iron, ℥iiss.
Citric Acid, in powder, ℥j.
Lemon Syrup, Water } of each, f℥iij.

Mix the syrup with the water, dissolve the phosphate in one half, the sulphate in the other half, mix them, and add the citric acid.

The resulting mixture is a transparent thin syrupy liquid, not very unpleasant to the taste. Each fluid ounce contains about twelve grains of protophosphate of iron and a little sulphate of soda. The dose may be either a dessert-spoonful or a table-spoonful (three or six grains), as the case may require.

Or the sulphate of soda may be avoided thus:—

Take of (Vallet's) Protocarbonate of Iron, ℥iiss.
Citric Acid, ℥iss.
Phosphate of Soda, ℥iij.
Lemon (or other syrup), Water } of each, f℥iij.

Triturate the carbonate of iron with half the water and the citric acid till dissolved, add the syrup, and lastly the remainder of the water in which the phosphate of soda has been dissolved.

The resulting liquid is a solution of phosphate of iron and citrate of soda, containing about three grains of the iron salt to the dessert-spoonful.

A syrup of protophosphate of iron may be made by dissolving five drachms of sulphate of iron, and six drachms of phosphate of soda, severally in hot sweetened water, mixing the solutions, washing the precipitate with warm sweetened water on a cloth filter, expressing carefully and forcibly, and dissolving the moist mass with two drachms of citric acid, and sufficient water to make the whole measure two fluid ounces. To this add six fluid ounces of simple syrup, mix, and filter if necessary. Each teaspoonful will contain three grains of phosphate of iron. It is

probable that the addition of sufficient ammonia to the solution to convert the citric acid nearly all into a citrate of that base, would render the syrup more permanent, but less agreeable; and by evaporating this solution, without adding sugar, to a syrupy consistence, it is quite probable that the soluble phosphate in scales, above alluded to, may be prepared.

The formula for "*Chemical Food*," or Compound Syrup of the Phosphates, may also, no doubt, be modified by substituting citric for phosphoric acid as a solvent for the phosphate of iron, as it has already for that of lime.—Ed. *American Journal of Pharmacy.*]

THE CHINESE GREEN COLOUR *LO-KAO*, AND SOME OTHER DYES.*

BY PROFESSOR S. BLEEKRODE, DELFT.

In 1846, cotton goods dyed by a vegetable green colour were introduced and exhibited by the French commissioners, for the trade of China, at Lyons, St. Etienne, &c., and other sorts, forwarded by M. de Montigny, the French consul at Shang-hai, were exhibited by the Chamber of Commerce, at Mulhouse, Rouen, and Lille. Mr. Daniel Koechlin-Schouch was the first who, in 1848, directed attention to the characteristic green dye, applied in such a way that only one side was coloured, the reverse being nearly without colour. This observation was made by the chemist to the firm of Koechlin and Benzard, at Rouen, in 1854. It was stated that this green colour was not a mixture of blue with yellow, but a pure and simple green, distinguished from all the other shades of that colour by its remaining pure in artificial light.

In 1852, the genuine green colouring matter was forwarded, by Mr. P. S. Forbes, the consul of the United States, to M. Persoz, at Paris ; a small quantity (only one gramme) being divided between M. Koechlin-Schouch (Mulhouse), M. Guinon (Lyons), and M. Espinasson (Rouen).

In October of the same year, M. Persoz made his first report to the Académie des Sciences, and in November immediately followed a communication by Professor Seringe to the Chamber of Commerce, at Lyons. This Chamber requested M. Natalis Rondot to procure five kilogrammes ($11\frac{1}{2}$ pounds avoirdupois weight) from China. This order was executed by Mr. D. Remi, at Shang-hai, and in October, 1853, were received 160 taels = 5.59 kilogrammes, valued at 2158 francs 33 cents. Several months before, however, M. Guinon was in possession of 256 taels of first quality, and two taels of second quality, bought by Messrs. Carvalho and Co., at Canton.

Towards the end of 1853, the same colouring matter was imported by the Dutch consul at Amsterdam. The results of the examination by Mr. Walter Crum and Mr. Mercer, of a small parcel sent over by M. Persoz, were published in Appendix L to the First Report of the Department of Science and Art, p. 432. Mr. Mercer ascertained the identity of the Lo-kao with the green colour of the Chinese cotton goods, and was of opinion that it was applicable for steam and self-dyed colours. Mr. Walter Crum considered it useless to the dyer unless means were found of dissolving it like indigo. Notwithstanding these inquiries, the firm of Halliday, Pochin, and Co., at Salford, owing to a lecture delivered by Mr. Crace Calvert, in December, 1852, applied to the Board of Trade that some investigations relating to this matter in China might be ordered to be made. Mr. Meadows, interpreter at Ning-po, forwarded, in 1853, the *Hwae-hwa*, being the undeveloped flowers or buds of the *Sophora japonica*, already cultivated in Kew Gardens, and at Lyons, since 1847.† (Annales de la Société Royale d'Agriculture de Lyons, March, 1847.) The firm of Renard, père et fils, tried it for dyeing silk yellow. It was introduced into Germany under the name of "Chinesisch Gelb-beeren" (yellow berries of China), and "Natalkörner" (grains of Natal). W. Stein, von Kurrer, &c., have published the results of their chemical and practical experiments. (Pharmac. Centralblatt, 1853,

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* In the sixteenth volume of the *Pharmaceutical Journal*, pp. 213, 517, and 553, there will be found communications by Mr. Hanbury and the Rev. M. Hélot on the Chinese green dye, but as the above paper gives much further valuable information respecting it, and as the dye is now attracting a considerable amount of attention throughout Europe, we have reprinted it entire, with a few additions and corrections.—Ed. Ph. Journ.

† See Paper by Dr. Th. W. C. Martius in *Pharm. Journ.*, vol. xiv., p. 64.—Ed. Ph. Journ.

pp. 193 and 845.) The same material was forwarded by the Dutch consul, who stated that it was employed to produce the green dye on cheap cotton cloth.

Mr. Sinclair, interpreter at Amoy, sent in a report relating to the same substance. It appears, from both communications, that this yellow was applied on a blue ground to produce a green, but this was not the direct and actual production of a green dye with Lo-kao. It was quite true, as Mr. Mercer says, that the *Hwae* failed in giving any indication of green. Mr. Walter Crum says: The substance produces a yellow dye, which in China "becomes green by an exposure of some duration to the sun ; but here, after three or four days, there are only signs of such a change being about to take place." But this was a supposition. The Chinese are careful to avoid the direct action of the sun on their cloths of Lo-kao-green. Mr. Sinclair says, that the cotton cloth is spread out on the ground in the open air, but not after the hours of nine and ten, when the sun becomes too powerful.

During and after the Paris Exhibition of 1855, the value of the Chinese colour applied to silk, became more and more appreciated. The *nouveautés* of this shade were much admired for the splendour and purity of their colour by artificial light, when the usual mixed green colours change to blue. The "Velours épinglé et coupé en vert Vénus" exhibited by the firm Gaudre et Co., occupied the first position among the articles of fashion during the spring of 1855. In July following, a new shade, obtained by mixing with yellow, was produced, under the name "Vert-Azof," and in August, evening dresses so dyed were sold by Million and Co., and in October and November in the Magasins of Heckel, Teillard, and Ponson. Relating to the application of the Lo-kao, M. Michel and M. Guinon have the merit of discovering the best method of dissolving it for dyeing silk. M. Guinon has kept the method secret.

From April, 1855-56, he has dyed 1500 kilogr. silk
" 1856-57, " 3500 "

with this colouring matter.

M. Michel has published his valuable investigations, which have been printed by order of the Chamber of Commerce at Lyons ("Rapport sur le Vert de Chine," par M. A. F. Michel, imprimé par ordre de la Chambre ; Lyons, 1856). In 1857 a new paper was published by the same Chamber ("Concours pour la recherche du vert de Chine, dans les végétaux indigènes et exotiques"). The value of Lo-kao was confirmed by its increased use for dyeing silk, the quantity imported during the first six months of 1857 being 1100 lb., of the commercial value of nearly £8000 ; from this it is evident how considerably its application in France has increased. The prices are variable ; they ranged in China from 24 to 25 piastres per *katty* (0.6045 kilogr. = $1\frac{1}{8}$lb.). At Lyons the kilogramme was sold at from 700 fr. to 500 fr. There are several qualities, the first being the original from Soo-chow-foo; then follows the second, from Canton ; and the third is prepared at Amoy, being the least valuable.

The Lo-kao of commerce is not a pure organic substance. Even when genuine it contains 30 per cent. of inorganic matter, which remains as ashes after incineration. I found 30.60 per cent. It contains from 9 to 10 per cent. of water. It is properly a mixture of finely-divided colouring matter with clay, so that nearly one-third of such a costly substance is of no use at all.

100 parts of ashes give substances—

Soluble in water	1.96
Soluble in hydrochloric acid	45.00
Insoluble	53.04
	100.00

The constituents of the ashes are not from impurities, notwithstanding that on the last occasion some were detected. It appears to be impossible to avoid these by the Chinese method of preparation, for the Lo-kao is not a simple exsiccated vegetable juice, like the indigo or other colouring matters.

The Chamber of Commerce at Lyons, after offering a premium of 6000 fr. for the preparation, &c., of a genuine pure dye matter, like the Chinese Lo-kao, published the above-mentioned paper, "Concours, &c.," containing several communications relating to this substance. The most interesting was that of the Rev. Père Hélot, being a description of the Chinese plants, of the process of dyeing at Azé, and of the

preparation of Lo-kao.* A communication of a similar character was forwarded by the Dutch interpreter at Amoy, M. de Grys, dated 30th May, 1857 (*Journal de Volksvlijt*, Nov., 1857). The other documents are—a letter of M. Aymery, Procureur des Missions des Lazaristes at Ning-po, dated 22nd August, 1856 ; and one from the Rev. J. Edkins at Shang-hai, containing some explanations, but no contradictions. There was also published a report of the Agricultural Society at Calcutta upon the experiments of Mr. Murray for cultivating the Chinese plants in the garden of the Society, dated March, 1854. Mr. Fortune forwarded the plants and seeds to Calcutta. M. Persoz, at Paris, who in 1857 was invited by the Agricultural Society of Calcutta to report on several materials, received only one piece of cloth of the original green colour. Living plants have been forwarded by M. de Grys to Holland, and received in May, 1857; they are at present in the Botanical Gardens at Leyden.

M. Natalis Rondot, celebrated for his profound knowledge of the Chinese and Oriental trade and commercial science, has the special merit of having indicated and assisted in importing plants and seeds of the vegetables from which the *Lo-kao* is prepared by the Chinese. He distributed the seeds from which plants have been cultivated at Lyons, Paris, Ghent, &c.

It had been already stated by the Rev. Père Hélot that the Chinese employed two different sorts of plants, one with a *white* bark, Pa-bi-lo-za, and another with a brown bark, Hom-bi-lo-za; one growing wild, and the other cultivated; but till the return of Dr. Lockhart from China, in 1857, it had not been possible to decide this. The Pa-bi-lo-za is the *Rhamnus chlorophorus* of Decaisne,† and grows wild, the Hom-bi-lo za is *Rhamnus utilis* of Decaisne, the cultivated plant. The first was introduced into Europe by M. Rondot, and was formerly called by Prof. Seringe, at Lyons, *Rhamnus sinensis;* the other by Mr. Fortune, and is now cultivated at Acton Green by Dr. Lindley, and at Turnham Green by Mr. Glendinning ; at Ghent by Mr. Van Houtte, &c.

M. Natalis Rondot published, at the commencement of last year, an admirable paper, by order of the Chamber of Commerce, entitled *Notice du vert de Chine et de la teinture en vert chez les Chinois, suivie d'une étude des propriétés chimiques et tinctoriales du Lo-kao, par M. T. Persoz, et de recherches sur la matière colorante des nerpruns indigènes, par M. A. F. Michel. Lyons*, 1858. This valuable work gives a review of whatever is at present known relating to this specialty.

The Lo-kao does not contain any principle that resembles the constituent of indigo, although it has been often spoken of as a green indigo. Poivre, who visited Cochin China in 1749, speaks of a plant, Tsai, producing a green dyeing matter. Horta, in 1760, mentions the same as employed by the Tonquinese. The word Tsai, however, is an adjective, applied to several herbaceous and leguminous plants, and hence nothing could be distinctly known by this denomination. Charpentier de Cossigny speaks of another substance—Dinh-xang; xang or xanh signifies, in the Cochin Chinese language, green. Mr. Hedde, who visited Tooran in 1844, said that the price of such a dyeing material per kilogramme was 2*s.* 6*d.*, and that it is probably collected from the *Mercurialis perennis*. It may then be concluded that Tsai and Dinh-xang were up to that time unknown materials.

Green indigo was imported into London in 1790 by Prinsep, and examined by Mr. Bancroft. This was supposed to be the Tsai of M. Poivre; but, as M. Persoz observed, it was only a mixture of chlorophyll (leaf-green) with indigo. Attempts were often made in India to produce a green material of the same composition. Kurrer speaks of it in 1801; Mr. Nicholas Cézard, in 1837; it was examined by Gustavus Schwartz, of the Société Industrielle de Mulhouse ; and in 1856 I received a specimen from Java of the same character.

The green coloured Barasat, forwarded by Mr. C. Birch, in 1793, from Calcutta, to Messrs. T. F. Baring and Co., and examined by Bancroft, was identical in composition. It was at that time supposed to be prepared from the *Asclepias tinctoria*, Roxb., but afterwards it was acknowledged to be the Taroem akkar or indigo of Sumatra, from the *Marsdenia tinctoria*, Rob. Brown, *Pergularia tinctoria*, Spr. *Taroem* signifies at Sumatra indigo. Marsden (in the History of Sumatra, ed. 1811, p. 94) mentions it as generally employed as a blue dye in Sumatra; the plant being common in the

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* *Pharmaceutical Journal*, vol. xvi., pp. 517 and 553.

† We are informed by Dr. Lindley that the *Rhamnus chlorophorus* of Decaisne is the *Rhamnus globosus* of Bunge.—Ed. Ph. Journ.

Indian Archipelago. The plant is likewise common in Borneo, but does not grow in Java; another species, *Marsdenia parviflora*, Dec, or Taroem aroi, is cultivated there.

In his report on the Paris Industrial Exhibition of 1855, the late Dr. Royle noticed three kinds of green (indigo), one Chinese, one from the Birman empire, and one from Assam. The last was exhibited by Dr. Falconer, under the name of *Roem*. This was quite different from the Lo-kao, being a product of a sort of *Ruellia*, generally cultivated in the Birman empire and Pegu. Lila roem is the indigo, from the *Wrightia tinctoria*, R. Br.

It is not astonishing that the name Lo-kao is pronounced and written in various ways. This is commonly the case when an Englishman, Frenchman, or Dutchman expresses a foreign term according to his own language. The Lokao of M. Rondot is Lak-kou (Carvalho), Luk-kaou (Edkins), Lau-kow (Remi), Louk-ko (at Canton), Liok-kou or Lek-ko (at Fokien), Loe-kaau (De Grys).* Mistakes frequently occur, therefore, when a European communicates with the natives, and hence Mr. Forbes, when asking for the green dye, received from the Chinese the Schweinfurther green, a European product, in a Chinese bottle, with Chinese inscriptions.

The plant is called Lo-sa; that with white bark, pa-bi (or pe-pi);† and that with brown bark, hom-bi (or hong-pi).* The Pa-bi-lo-sa, or *Rhamnus chlorophorus*, ranges from 25° to 26° N.L., and principally between 30° and 31° in the mountains of Khiu-tsjeou-foe, at the S.W. of Tsje-kiang, and at Canton, Hang-tsjeou-foe, Kia-hang-foe, and Ning-po. Fagots of it are sold at 17*s.* per two hundred-weight, but the bark only being 50 per cent., its price is properly double of this sum. The Hom-bi-lo-sa, or *Rhamnus utilis*, is found from 30° to 39° N.L., also in a more temperate climate. The fagots are sold at 7*s.* per hundred-weight, the bark costing 14*s.*

M. Rondot is of opinion that both plants could be acclimatized in the south of France.

It was not less difficult to decide what parts of these plants were employed. In 1852, Mr. Bourboulon, at Macao, and Mr. Carvalho, at Canton, reported to the French Minister of Foreign Affairs, that the flowers and foliage were used, but M. Persoz, at Paris, received some cloth dyed by the colouring matter obtained from the roots. MM. Marc Arnaudtizon, Edkins, Hélot (as usually at Azé), Aymery (as usually at Tsji-li), noticed the bark.

It appears that the fruits being small black berries, with a hard nucleus, as large as that of the hemp-plant, contain likewise a colouring matter. The Rev. Père Hélot denies this. Mr. Edkins, however, asserts that the Chinese prepare from it a green colour, and M. Remi confirms this, saying that it is specially employed for both water and oil-painting, whilst the bark serves to dye cotton cloth. Mr. Fortune noticed that the colouring matter of the fruit is used for painting on paper.

The Lo-kao (translated in our language green paste) is the sediment remaining after dyeing the cotton cloths with the bark of both plants, a thousand pieces producing only one kilogramme. A friend of M. Rondot, at Shang-hai, wrote to him that he should be able to send over 800 or 900 lb., which would be the sediment after the dyeing of a million of pieces. This, however, is not astonishing, when we consider that the colour green is that most liked by the Chinese, for in several places regular green-dyeing establishments exist in that country.

The fagots, not older than one year, are cut in small pieces, and the colour is extracted by boiling in water. At Azé, both sorts of plants are boiled and extracted in separate vats; in another vat is prepared lime-water. The cotton cloth is dyed from seven to ten times in the extract from Hom-bi-lo-sa, and then three times in the extract from Pa-bi-lo-sa. Before dyeing, a small quantity of lime-water is mixed with the liquid extract. The cloth is dyed in the afternoon, spread out in the fields during the evenings, and taken up in the morning before nine or ten o'clock, so that the cloth only undergoes the action of diffused daylight. The effect is that the upper side becomes green, the under side remaining quite colourless. When at first this characteristic appearance of the Chinese green cloth was observed in Europe, it was supposed that the colour was applied by brushes or some other mechanical means, totally unknown to the European dyer. Such was the opinion of Mr. Mercer and M. Persoz. Since, however, M. Michel, at Lyons, had succeeded in

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* Lüh-kaou of Morrison.—Ed. Ph. Journ.

† Written Pih-pi and Hung-pi by Morrison.—Ed. Pharm. Journ.

producing a green colour by the action of sunlight alone on cloth, dyed with an indigenous evergreen sort of *Rhamnus*, M. Persoz acknowledged it to be a new, and, till now, unknown effect of sunlight in producing vegetable colours.

After spreading, the cloth is rinsed in vats with pure cold water; there are five or six arranged in a row. The water assumes a light green colour. All the wash-waters are collected in one vat, the bottom of which is covered with cotton thread. By boiling, the colouring matter is precipitated on the cotton, and the water above becomes colourless. From this cotton the colouring matter is separated by merely pressing and wringing, and then spread on blotting paper and dried. The Lo-kao then assumes the appearance of thin scales, like dried orange bark.

Persoz assumes, as a distinctive new principle or constituent of the Lo-kao, the *Cyanine*, a substance not containing nitrogen. As I before stated, the ashes contain 45 per cent. of matter soluble in hydrochloric acid; of this are 31.16 lime (Ca O), so that nearly $\frac{1}{3}$ of the ashes are lime; 13.24 per cent. ($Fe_2 O_3$) oxide of iron, alumina and phosphoric acid, probably decomposed from the clay of the ground where the cloth has been spread. It must be remarked that the Chinese distinguish the cloth dyed with the extract of the plants, Se-lo-poe, with one coloured side, from the cloth dyed with Lo-kao, the latter being called Oe-lo-poe, coloured on both sides, as usual.

It is a characteristic of the green-dyed Chinese cloth, that its colour, when moistened with concentrated hydrochloric acid, vanishes, but after some time reappears. This experiment can be repeated several times without destroying the dye. The colour is changed to purple red by the action of hydrosulphate of ammonia; chloride of tin changes it to salmon colour. On that ground M. Persoz supposes that there is really mixed with it a yellow colour, derived from a substance resembling the Persian berry. Should this be further confirmed, it will agree with the information I have received, that the Hwa-wha is used for reviving the green colour of Lo-kao in dyeing common cotton cloth.

M. Natalis Rondot says, likewise, that all his inquiries tend to show that the yellow colour of Hwa-wha, or of the Hoang-tsji, is employed to vivify the bluish green of the Lo-tsé. This explains why the Lo-kao of Soo-chow-foo is more tending to blue, and that of Amoy more to yellow. The properties of the Lo-kao are, according to the description of M. Persoz, as follows:—

Lo-kao is insoluble in water, soluble in alcohol, ether, sulphide of carbon, and volatile oils. By soaking it can be intimately mixed with 25 or 30 parts of water. By heat it is decomposed without sublimation; on burning it gives a light yellow flame. Acetic acid facilitates its being dissolved, and the mineral acids, hydrochloric and sulphuric acid, have the same effect; a weak solution of tartaric acid rapidly dissolves it at ordinary temperatures. The reaction consists principally in dissolving the combinations with lime. The above-mentioned acids exercise no reducing or oxidizing action, but when concentrated or assisted by heat, they only decompose the supposed yellow constituent of the dye. Lo-kao is dissolved in concentrated hydrochloric acid, and produces a green gelatinous fluid; after some hours the coagulated part becomes grey, the liquid above being yellow. When this sediment is washed, and neutralized by ammonia, the green colour is not restored, but a blue or violet is produced.

The colour is destroyed by the oxidizing acids. If exposed with caution to the action of these acids, the green colour changes first into red, and then into light rose-colour. The red colour appears equally by the action of the deoxidizing acids, sulphurous acid, arsenious acid, oxalic acid, and formic acid. Hydrosulphuric acid changes the colour into blood-red; this colour vanishes as the hydrosulphuric acid becomes decomposed by the influence of the atmosphere, and then the original green colour is restored.

With concentrated sulphuric acid it forms a wine-coloured solution, which is decomposed by water. From the sediment, however, the original green substance cannot be reproduced.

The caustic alkalies appear to dissolve it, but by a long-continued action, or by boiling, the colour is changed into brown, applicable for dyeing cotton, by the aid of alum or a salt of tin. The same reaction follows when it is boiled with lime-water, or the carbonates and sulphates of the alkalies. Sulphide of ammonium has a specific reaction, changing the colour into red, as is mentioned above.

The Lo-kao, after soaking in water, becomes very soluble in warm solutions of

soda or borax. These solutions can be employed to dye cotton cloth directly. Soap made with soda dissolves it very easily. A solution of soda-soap, containing from five to six parts per 1000 of water, dissolves it, with the aid of heat, and forms a perfect dyeing-liquid for cotton.

Chloride of zinc and chloride of magnesium change the colour into pure blue, resembling indigo blue on cotton. The salts of alumina give to the colour rather a bluish tinge. The salts of tin change the colour into blood-red. This colour is the best for dyeing silk, because, after saturation with an acetic alkali-salt, and exposure to the atmosphere, the green colour reappears. In this case, much attention is to be fixed on the degree of concentration of the salt.

In every case it is necessary, for uniform dyeing and printing by Lo-kao, that it should be freed from earthy constituents. The best way of doing this is given by M. Persoz. The soaked Lo-kao is dissolved in a concentrated solution of carbonate of potash. After having separated the sediment, the liquid is diluted, and then from this the green colouring matter will fall down. The Lo-kao can likewise be dissolved in $1\frac{1}{2}$ parts of acetic acid, diluted by 5 of water; this is properly the clearing from the combination with lime. After filtration, the liquid is neutralized by ammonia, and the Lo-kao subsides in a pure state. For further details, the admirable work of M. Natalis Rondot may be consulted. I will only add that, for printing, the Lo-kao is diluted with a solution of gum, alum, acetate of alumina, &c.

It would be of great importance to ascertain whether there are any European plants containing the principles for a colouring matter resembling the Lo-kao. Since it was decided that the Chinese prepare it from two sorts of the genus *Rhamnus*, the way was opened for making experiments with European species, such as *R. alaternus, frangula, catharticus, hybridus, alpinus.* M. Michel, at Lyons, succeeded in treating cotton cloth with the extract of the *R. catharticus*, especially by spreading it at night, and taking it up every morning before sunshine, which, when repeated several times, produced a green colour on one side very much resembling the Lo-kao.

The genus *Rhamnus* was long since mentioned as producing green and yellow colours. The *vert de vessie* is prepared from the unripe fruit of *R. catharticus;* the Persian berries from *R. saxatilis;* the *grains d'avignon*, or yellow berries, from *R. infectorius.* A green or yellowish-green can be dyed with the foliage of the black alder tree (*R. frangula*). It is very remarkable that the wood of the *R. alaternus* can be employed for blues; and hence appears the possibility that, by mixing it with the yellow that can be extracted from the bark of another kind of *Rhamnus*, a green colour may be procured. In that way it could be explained why the Chinese employ two different sorts of the same genus of plant. Very much, however, depends on the climate and season. In Sweden, where the *R. frangula* is employed for dyeing woollen cloth, the bark is separated from the plants and dried. The fruit of the same plant gives a yellow colour before ripening in July and August, but in September and October, after ripening, a blue-purple, green, or blue, varying with the composition employed as a mordant.

We may now conclude that the problem, how the Lo-kao is prepared, is not entirely solved, but there is no doubt that the scientific investigations made in Europe will soon supply this want. We are indebted to M. Natalis Rondot for having drawn the attention of European manufacturers to some other vegetable colours used by the Chinese dyer.

In the first place may be mentioned the Hoang-tsji or Wong-shi. Hoang or Wong signifies yellow, and hence it is the yellow colouring matter of the Tsji. It is called by the Germans *Chinesische gelbschoten.* It is, in fact, the berries of *Gardenia,** which appear to be capsules filled up with brown-coloured, very hard grains or seed in a yellow pulp; the yellow colouring matter is combined with the vegetable jelly of the pulp. By soaking in cold water a very pure yellow colour is produced, that can be fixed on cotton cloth without the use of a mordant. The colour is not attacked by alkalies or acids, with the exception of nitric acid.

In September, 1857, the Chamber of Commerce of Lyons bought a quantity of $22\frac{1}{2}$ kilogrammes from Prof. Th. Martius, at Erlangen, paying 3*s.* 4*d.* per kilogramme. In January, 1858, M. Rondot received $2\frac{1}{2}$ kilogrammes from MM. Remy, Schmidt, and Co., at Shang-hai.

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* *Pharm. Journ.*, vol. xviii. p. 626.

There are three sorts: the largest fruits from the *Gardenia grandiflora* (Lour.). This Hoang-tsji is called by Mr. Hanbury, Tsji-tse, and is the same as that sold by Prof. Martius. It is mentioned by Kaempfer.

Another sort of better quality is in egg-shaped fruits, the *Gardenia florida* (Lour.). Mr. Hanbury calls this *Sjan-tsji*. The third sort is the smallest, nearly globular. It is not determined whether it originates from *G. florida* or *radicans*. The same sorts of plants are very common in Java, where the name is *Katja-piering*, and also in the other islands of the Archipelago. In Java it is only an ornamental flower, because, owing to the high temperature, the fruit is not developed. In the higher districts like Tjipannas, at 3400 feet above the sea, the fruit can be largely collected. The Chinese species of *Gardenia* was introduced and cultivated at Java at the same time that the culture of tea was undertaken, because the colour was employed in China for colouring the tea chests. At that time it was not generally known that the plant is a native of these islands. I hope shortly to receive the fruit from Java for a comparative examination.

At Sumatra, our celebrated botanist, Mr. Teysman, has detected another species, *G. glutinosa*, whose fruits give an equally beautiful yellow colour. Samples of this sort will be likewise forwarded for trial.

The other vegetable yellows of the Chinese are, *Hoang-tang*—probably the root of *Menispermum cocculus*, or Indian berries, or *Fibraurea tinctoria* (Lour.). *Hoang-tsji*, or Safflower, from *Carthamus tinctorius; Hoang-pe-mou*, or bark of *Pterocarpus flavus* (Lour.). *Ti-hoang*, the root of *Rhamnesia sinensis; Kiang-hoang*, the root of *Curcuma longa*, the *Turmeric*: the Hwae-hwa, Hoai-hoa, Wei-fa, or the non-developed flowers of *Sophora japonica*, as already mentioned. It is sold in China at 5*d*. or 6*d*. the kilogramme. It is well known that it is employed for dyeing green with Lo-kao, or alone for producing yellow. Mr. Meadows asserts that, by a process kept secret in the province of Canton, the Hwae-hwa is employed to dye cotton and silk green, without mixing or grounding with blue, but this requires confirmation. It was stated by Mr. Sinclair that at Amoy there exists an establishment for dyeing cotton green, but the process is unknown. At Tjang-tjsoe-foe it is said to be employed for dyeing silk green. This material is called at Canton Oee-fa; Ningpo, Wae-hoei; Amoy, Hoeae-ho. It was, in 1851, exhibited as Whi-mu.

The plants producing a blue colour are called by the Chinese Lan. Such are several sorts of the genus, *Polygonum* and the *Ruella indigotica* of Tsje Kiang. The indigo of the southern provinces is prepared from *Isatis indigotica*. From the same genus the Woad is procured. The Dutch ambassadors sent to Pekin nearly two hundred years ago, P. de Goyer, and Jacob de Keyzer, make mention of the blue dyeing with the *Tyen-wha* or *Tien-hoa* of the *Isatis*.

The indigo of the *Indigofera* bears the name of *Thoe-tien* or *Tsja-lan*.—*Journal of the Society of Arts*, August 5, 1859.

ON MARSH SELINUM AS A REMEDY IN EPILEPSY, &c.

BY DR. TH. HERPIN.

In the July number of the *Journal de Pharmacie et de Chimie* for the present year there is an article on the above substance, in which it is recommended as a remedy in epilepsy and some other nervous affections. From this paper it appears that this remedy was first discovered in 1807 by Dr. Trinius, a Russian physician, who obtained the secret from a peasant, who had employed it with much success in epilepsy. In 1818, Dr. Trinius related these facts to the Physico-Medical Society of Moscow.* In 1826, it was tried with success in epilepsy by some Swiss physicians, who reported the same to the Medico-Chirurgical Society of Zurich.† In 1827, Peschier published an analysis of the root of the above plant, and also narrated several cures obtained by its use.‡ From 1827 to 1852, nothing original appeared regarding it, but at the latter date Dr. Herpin published a Treatise on epilepsy, in which several articles were devoted to it.§ Since that period, Dr. Herpin (the author

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* *Mémoires de la Soc. Phys. Médic. de Moscou*, t. iii., p. 86.

Verhandl. der Medic. Chirurg. Gesellich der cant. Zurich, 1826, pp. 16 et 122.

‡ *Actes de la Société helvétique des Sciences naturelles*, en 1827.

§ *Du Pronostic et du Traitement curatif de l'Epilepsie*. Paris, 1852, Baillière, pp. 594 et suiv., 612 et suiv.

of the present paper) states that he has had much further experience in the use of the *selinum*, having employed it in a great number of cases, and, feeling certain that the remedy does not deserve the oblivion into which it has fallen, he has now made known his researches upon its natural history, physiological effects, posology, &c.

Natural History.—The author shows that the marsh selinum, which belongs to the Nat. Ord. *Umbelliferæ*, has received various names by different authors. Thus, it is the

Selinum palustre (Linn. De Cand.).
Selinum sylvestre (Jacquin).
Selinum thysselinum (Krantz).
Thysselinum palustre (Hoffman, Koch., Gaudin).
Thysselinum Plinii (Sprengel).
Thysselinum sylvestre, palustre et angustifolium (Reichenbach).
Thysselinum sylvestre (Vaucher).
Peucedanum sylvestre (De Candolle).
Peucedanum palustre (Mœnch, Duby, Cosson et Germain, Grenier et Godron, Boreau et Godet.)

The author then shows that the last name is the one by which the plant should be distinguished, and afterwards gives a botanical description of it under that name (*Peucedanum palustre*), and then makes known its habitats. The root (the part used) is described as branched, fleshy, of a deep brown colour externally, white and milky within, having a strong aromatic odour, and an acrid and *piquant* taste.

The plant is common in the north and east of France, less so in the centre and west, and apparently wanting in the south. It is also found in certain parts of Switzerland, Germany, and Russia.*

Materia Medica.—The root is the only part of the plant which has been employed, but the fruit has a similar taste, and hence the author supposes that it would possess somewhat analogous properties. The dried root resembles that in a recent state in its odour, taste, and colour, although in the latter particular the brown colour is less deep. The powder is described as of a bright yellow, bordering on grey.

According to Peschier, the root contains *a volatile oil, a fatty oil* soluble in ether and alcohol at 34° C. (= 93° Fahr.), *gummy matter, a yellow colouring principle, a nitrogenous mucoso-saccharine principle, a peculiar acid*, which it is proposed to call *selinic, phosphate of lime*, and *woody matter*. The oleo-resinous matter constitutes an eighth or tenth part of the root, and hence Peschier recommends an alcoholic extract as the best preparation. The author, however, says that he has had but little experience in the use of such an extract, but, judging from his own experience, he prefers, and always employs, the powdered root.

Physiological Effects.—The selinum appears to act principally upon the parts connected with digestion. In seventy-nine cases in which it was tried by the author, a somewhat purgative effect was observed in half of them, and in a few instances nausea, gastralgia, or dyspepsia was noticed, although in a trifling degree only. In no case was any injurious effect produced upon the general health, but, on the contrary, its use appeared, in some instances, to have a beneficial influence. In the majority of cases in which it was employed it exercised a very favourable influence upon menstruation, and the disorders incident thereto.

Posology.—In the treatment of epilepsy the author was accustomed to administer the selinum three times a day; but if, in the course of the treatment, the patient suffered from diarrhœa or colic, the number of doses was reduced to two, or sometimes to one in a day. The commencing weekly dose for an adult was 30 grammes (= 463 grains), which was divided into 20 doses, and administered at the times above stated. This dose was increased weekly by 15 grammes, until it became 120 grammes, which quantity would be arrived at in the seventh week. In the eighth week the dose was increased to its maximum, namely, 125 grammes; and this weekly dose was continued for six weeks longer in those cases in which the remedy was unsuccessful, and for a much longer time still if an evident remedial effect was observed. The dose for children from seven to fifteen years old was reduced by a third, and for infants by two-thirds.

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* This plant is generally known in England under the above name of *Peucedanum palustre*. It is a rare plant with us, but may be occasionally found in marshy and fenny districts.—Ed. *Pharm. Journ.*

Therapeutics.—The author states that in 1852, with his then limited experience, he arranged the four medicines which had succeeded with him in the treatment of epilepsy in the following order: selinum, oxide of zinc, ammoniacal sulphate of copper, and valerian; but with his present experience, without changing the order of the three last, he would remove the selinum from the first to the fourth rank, but at the same time preserving for it an important value.

The author thinks that it would be desirable to try the selinum in other nervous affections, as hysteria, chorea, &c. He also says that he has recently obtained most favourable results with it in a case of hypochondriasis and in three cases of hooping-cough. Dr. Herpin concludes his communication by expressing further confidence in the future success of the selinum, in consequence of discovering in the works of Dioscorides a description of a Peucedanum, which had very many analogies with that of *Peucedanum palustre*, and which was stated by him to be useful in epilepsy and other nervous affections, in retention of the menses, catarrh, &c. The Peucedanum of Dioscorides, however, differs from the present species (*P. palustre*) in several particulars; thus, it has yellow instead of white flowers, and is found in mountainous districts, not in marshes. It appears to the author to be the *P. officinale* of modern botanists.* This Peucedanum is mentioned by Pliny, and is alluded to also in most of the treatises on Materia Medica until the close of the last century, but it has since fallen into disuse. The author proposes again to try its effects.

ON THE SYNTHESIS OF THE HYDROCARBONS.

BY M. MARCELLIN BERTHLOLET.

(*Continued from page* 125.)

Fourth Part.—*Formation of the more complicated Hydrocarbons by the action of Heat upon the Acetates and Butyrates.*

The synthesis of the more simple hydrocarbons, such as marsh gas, olefiant gas, and propylene, is effected by means of the binary compounds of carbon, the oxides, sulphides, and chlorides. The more complicated carbides of hydrogen cannot, however, be obtained from the same source. For their production it is necessary to react on the simple hydrocarbons previously formed. Thus from olefiant gas, prepared from inorganic materials by the methods described, ordinary alcohol may be obtained, which may be again readily converted into acetic acid. The synthesis of olefiant gas therefore involves that of alcohol and acetic acid; the latter body may therefore be taken as a new starting-point for the synthesis of other organic compounds. The following reasons also indicate its suitability for this purpose:—Acetic acid is very analogous to formic acid in its physical and chemical properties, but it is richer in carbon and hydrogen, and poorer in oxygen; consequently more suited to yield hydrocarbons when submitted to the same conditions as those under which formic acid was decomposed, that is to say, when distilled with an alkali, which retains the oxygen as carbonic acid, and leaves the carbon and hydrogen free to enter into combination. It is, in fact, in this manner that Chemists generally prepare marsh gas, but as marsh gas, $C_2 H_4$, presents a more simple composition than acetic acid, $C_4 H_4 O_4$, its formation by means of the acetates is not a process of synthesis but of analysis. It will be shown, however, that, simultaneously with this gas, and as secondary products resulting from the same reaction, carbides of hydrogen more condensed than marsh gas are formed. These are olefiant gas, $C_4 H_4$, propylene, $C_6 H_6$, butylene, $C_8 H_8$, amylene, $C_{10} H_{10}$, &c.; carbides characterized by having the same composition, but a different condensation. These phenomena have been previously pointed out in the distillation of formiate of baryta, where olefiant gas, propylene, and probably still more condensed carbides arise. In the destructive distillation of the acetates they occur to a greater extent, and still more so with the butyrates and with sugar, bodies progressively richer in carbon. These changes, in fact, appear to occur with all organic matters when heated with excess of alkali; the analytical character of the decomposition is already known, the object now in view is to point out the synthetical action which takes place simultaneously.

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* The *P. officinale* is found in some parts of England, but not in mountainous districts, as mentioned above by the author, but in salt-marshes in Kent, Essex, &c.—Ed. *Pharm. Journ.*

The intervention of the alkalies in these changes is not indispensable; heat alone is sufficient in certain cases to effect the same production of the carbides of hydrogen from the elements of the organic matter, but the volatile substances, such as acetic or butyric acids, generally require for their destruction a higher temperature, and furnish more simple products, when heated alone, than when in contact with an alkali. The presence of the alkali determines the decomposition of acetic acid at a temperature little above 400° C., and the products can be immediately removed from the further action of the heat, which tends greatly to their preservation; free acetic acid, however, may be made to traverse a tube heated to dull redness without decomposition occurring, and to effect its destruction the temperature must be so elevated, and prolonged in such a manner, that the resulting compounds are but few and very stable. Among these latter bodies are found, however, certain hydrocarbons, very stable, and yet remarkable for the complexity of their formulæ; such as naphthaline and benzine, which are obtained in decomposing acetic acid and alcohol at a redheat. In proportion as the formation of the more complicated carbides increases, so the means of synthesis becomes more and more powerful; from the simple and stable mineral compounds, of which the conditions of equilibrium are so firm and preponderating, the delicate and mobile bodies which characterize organic compounds, and which are easily transformed and combined one with the other, are gradually formed. From the carbides of hydrogen the oxygen compounds are obtained, such as the alcohols, which may be again submitted to those various and ingenious reactions which Chemists are successively imagining. It is not necessary to follow out the infinite results which may be thus obtained, but simply to demonstrate that carbides of hydrogen are formed more complicated than the body decomposed, observed in the case of the formiates and acetates, and also the butyrates, and which appears to belong to all analogous compounds. It is therefore a general process of synthesis, because each carbide furnishes an alcohol, each alcohol a corresponding acid. If, then, the acid can form in its turn a carbide more complicated, analogous to the first, having an alcohol and an acid, it is obvious that this is a means of synthesis apparently without limit.

Dry Distillation of the Acetates.—The general principles of this action having been explained, it is only necessary to describe the experiments from which they were deduced. Pure acetate of soda was employed, deprived of its water by fusion, and of which the total quantity used in the various experiments amounted to 10 kilogrammes. The acetate of soda was heated in various ways. It was distilled by itself, mixed with its own weight of iron filings, with its weight of soda-lime, and lastly with twice its weight of soda-lime; these various conditions did not appear to exercise any marked influence on the production of the carbides of hydrogen, but modified extremely the nature and proportion of the empyreumatic liquids. To simplify the results and diminish the proportion of these liquids, the mixture of one part of acetate of soda and one part of soda-lime was generally employed. This mixture was introduced into a glazed stone retort, and carefully heated; the gas formed was passed through two cold vessels, two ovoid eprouvettes containing bromine, a washing bottle holding soda solution, and then collected over water. The gas collected over the pneumatic trough consisted of marsh gas sensibly pure. In the bromine was condensed the olefiant gas and the analogous carbides: propylene, butylene, amylene, &c. The excess of bromine was immediately dissolved in a solution of soda, moderately concentrated, without avoiding the heat disengaged by the reaction. In this manner the alkali destroyed not only the excess of bromine, but also several bromides formed by the pyrogenous liquids, and the destruction of which is indispensable to obtaining, in a state of purity, the bromides of the hydrocarbons. If a great excess of alkali is not at once employed, the decomposition of the liquids indicated is accompanied by a development of extremely irritating vapours, producing inflammation of the eyes, and at the same time the supernatant liquid is deeply coloured. When the reaction of the alkali upon the bromine was complete, and the liquid had become cool, eight or nine times its volume of water was added to the alkaline solution, to avoid the precipitation of pulverulent bromate of soda, and the neutral, colourless bromides of the hydrocarbons separated by a pipette. The products of several such operations were then mixed together and submitted to fractional distillation; the bromides passing over below 140° C., between 140° and 155°, from 155° to 170°, and between 170° and 200° were collected separately. At this point abundant vapours of hydrobromic acid were

disengaged, and the liquid contained in the retort commenced to blacken; the distillation was consequently stopped. The separated portions were then each redistilled separately. After three series of systematic distillations the following products were obtained:—

1. A liquid boiling at about 145°, consisting of bromide of propylene. It was the principal product.
2. A liquid boiling at a little above 160°, consisting of bromide of butylene.
3. A liquid boiling between 175° and 180°, consisting of bromide of amylene. This was in small quantity, and at each distillation disengaged a little hydrobromic acid.
4. Several drops of a liquid boiling below 140°, consisting of a mixture of bromide of propylene and bromide of olefiant gas.
5. In the retort in which the first distillation was effected several liquid bromides remained, which decomposed at 200° without volatilizing. These liquids apparently contained bromides of the hydrocarbons more condensed than amylene. The carburetted hydrogens were then regenerated from their respective bromides, and submitted to analysis. The following is the evidence by which the formation of the hydrocarbons mentioned above was established. The existence of *olefiant gas* was established by the separation of a bromide boiling below 140°, from which the olefiant gas was regenerated, mixed, however, with a little propylene. Submitted to the action of sulphuric acid, the gas was very slowly and gradually absorbed, requiring prolonged agitation, in a manner quite characteristic of olefiant gas. The formation of this gas was also established by obtaining its iodide, decomposable by potash at 100° C., with liberation of the olefiant gas; this experiment enabled the gas to be completely isolated. The gases formed during the distillation of acetate of soda were passed through a flask with a long neck, in which some iodine was kept in a state of fusion. The excess of iodine was afterwards dissolved in a solution of soda, and a half carbonized substance isolated, which consisted of a mixture of the iodide of olefiant gas with several products of the decomposition of the other gases or pyrogenous vapours by the iodine. This body was then introduced into a small flask filled with potash and boiled, when the gas was disengaged, collected, and analyzed in the eudiometer. Its composition accorded with that of olefiant gas. The possibility of isolating the olefiant gas from the other analogous carbides, by means of iodine, is very interesting, because these carbides are also capable of uniting with this metalloid; but it seems that their iodides are formed with less facility, and are much more easily destroyed by the heat employed in the reaction. The proportion of olefiant gas formed in the distillation of the acetates is very small.

The formation of *propylene* was established by the neutral liquid bromide obtained, boiling at 140°, and which, when analyzed, gave—

	1.	2.
Carbon	17.2	17.8
Hydrogen	2.9	3.0
Bromine	79.4	79.2
	100.0	100.0

according with the formula $C_6 H_6 Br_2$. The bromide was then decomposed in the usual manner, and the gas obtained analyzed in several different ways, the result of which established the presence of propylene. This body was more abundant than any of the other analogous carbides produced by the dry distillation of acetate of soda. In consequence of this fact, and with a view to obtain a more characteristic verification of the existence of this body, an endeavour was made to obtain propylic alcohol and some of its ethers from the gas of the acetates. For this purpose 20 litres of the gas from the acetates, collected over water, were agitated, first, with sulphuric acid diluted with its own volume of water, to remove the empyreumatic vapours, then shaken, litre by litre, with concentrated oil of vitriol. This acid, after the operation, presented the peculiar odour which is characteristic of its action on propylene; carefully diluted with water, saturated with chalk, and then evaporated, a very hygrometric lime salt was obtained, having all the properties of propyl-sulphate of lime. This salt was mixed with benzoate of potash, and distilled in an oil bath; it furnished, at between 220° and 240°, a benzoic ether, having the odour, the boiling point, and the properties of propyl-benzoic ether.

In connexion with the formation of propylene in the distillation of acetate of soda, may be described several experiments made upon the pyrogenous liquids obtained

from the same source. These liquids were submitted to several operations for the purpose of seeking for wood spirit or methylic ether. It is not necessary to state the reasons which caused the presence of three bodies to be suspected, but one of the experiments led to a result of considerable interest : the formation of a gaseous carbide which appeared identical with propylene, by the action of sulphuric acid upon acetone.

The experiment was made upon commercial acetone, also upon the several pyrogenous liquids from the acetate of soda, both in the crude state, and after being separated one from the other by means of fractional distillation. Pure acetone and liquids, soluble and insoluble in water, boiling at 65°, from 66° to 75°, from 75° to 90°, from 85° to 100°, from 100° to 150°, and from 150° to 200°, were thus operated upon. The four last furnished no particular combustible gas except oxide of carbon; the others furnished a few bubbles only. The most preferable result was obtained with acetone prepared from acetate of soda and purified as completely as possible; 40 to 50 grammes of concentrated sulphuric acid were introduced into a flask of 200 cubic centimetres' capacity, and 15 to 20 grammes of the acetone carefully added in small portions at a time, avoiding any notable elevation of temperature; a cork, adjusted with two tubes, one to conduct the gas liberated to the mercurial trough, the other to introduce a current of carbonic acid, was then fitted to the flask. The air in the apparatus was displaced by the carbonic acid, the current of which was then stopped and heat carefully applied to the flask. The reaction was extremely active, the mass swelled up and became carbonized ; a mixture of sulphurous acid and carbonic acid was evolved, together with a small quantity of a combustible gas: the whole of these were collected over mercury, and the reaction continued by the aid of heat for a length of time, which caused the formation of some oxide of carbon. In the eprouvette which contained the gas was introduced some solid potash with a few drops of water. Almost the whole of the gas was soon absorbed, but a small quantity of a combustible hydrocarbon remained, which was not sensibly soluble in water. This gas was submitted to analysis, the result of which indicated that it consisted of propylene, hydride of propyle, and a little oxide of carbon. The analyses, however, could only be made upon very small volumes of the gas. It is a question whether this gas resulted from the direct action of sulphuric acid upon the acetone, or upon minute traces of propylic alcohol mixed with the acetone. Propylic alcohol and its ethers are the only bodies, up to the present time, known to furnish propylene and hydride of propyle under the influence of sulphuric acid. The formation of this alcohol in the distillation of the acetates is of very great interest; unfortunately the proportion of the gas obtained only amounted to some thousandths of the weight of the acetone employed, which rendered the precise determination of its origin very difficult.

The *butylene* was regenerated from its bromide, which boiled at 160° C., and analyzed. The results left no doubt of its nature.

The bromide of *amylene*, which boiled between 175° and 180°, accompanied by slight signs of decomposition, contained 70.2 per cent. of bromine, agreeing with the formula $C_{10}\,H_{10}\,Br_2$. The amylene was regenerated from the bromide in the usual manner, and obtained as a volatile liquid having the characteristic odour and properties of that body. In consequence of a small quantity of this liquid only being obtained, it was analyzed as a gas, according to the method employed by Gay Lussac and Faraday, by allowing its vapour to be diffused in a certain quantity of air.

It is probable that, in the distillation of the acetates, carbides of hydrogen analogous to amylene, but more condensed, were formed, because the crude mixture of bromides contained a sensible proportion of products less volatile than the bromide of amylene, and which could not be distilled without decomposition; their proportion, however, was too small to admit of their being further studied.

The formation of olefiant gas, propylene, butylene, and amylene, at the expense of the elements of acetate of soda, is thus established. It may be asked, however, if these carbides pre-existed among the gaseous products of the distillation of acetate of soda, or whether the bromides from which they were extracted were formed by the reaction of the bromine upon the pyrogenous liquids resulting from the same distillation? To solve this question, bromine was separately mixed:

1st. With a portion of the crude liquid products, obtained during the distillation of the acetate of soda, and at the same time as the preceding bromides.

2nd. With pure acetone, extracted from another portion of the same product.

3rd. Separately with the products insoluble in water, boiling between 60° and 80°, 80° and 100°, 100° and 120°, 120° and 150°, 150° and 200° C.

4th and lastly, with the aqueous liquids separated from the preceding substances, which might contain other empyreumatic principles.

The reaction of the bromine upon almost all these liquids was extremely active; when it ceased, the products were allowed to stand for an hour or two, and then treated with a diluted solution of soda, which dissolved the excess of bromine and destroyed several bromine compounds which had been formed at the expense of the acetone and other liquids. This destruction complete, a few little drops only remained, of a bromine compound, neutral and liquid, which was not bromide of olefiant gas or any analogous carbide, but *bromoform*. It boiled at near 150°, and contained 95.1 per cent. of bromine; thus agreeing with the formula C_2 H Br_3. Treated in the usual manner with copper, water, and iodide of potassium at 275°, nothing but marsh gas was regenerated. M. Dumas has already indicated this production of bromoform from acetone. It is possible that a little bromoform, formed from the vapours of acetone carried over by the gas from the acetates, occurs mixed with the bromides of the hydrocarbons, but the quantity is very inconsiderable; it is separated in great part by the fractional distillations, and its presence need not, therefore, be considered as in any way affecting the results.

The preceding experiments demonstrate that the bromides of olefiant gas, of propylene, butylene, and amylene, resulted from the direct action of the bromine upon the gas of the acetates, and prove the pre-existence of those hydrocarbons. The proportion of the carbides obtained vary according to circumstances; under the most favourable conditions the carbon they contain may amount to one twentieth of the total carbon present in the acetate of soda.

Action of a red heat on Alcohol and Acetic Acid. Synthesis of Benzine and Naphthaline.—The synthesis of naphthaline may be effected by processes previously described. This substance has been formed from the elements of sulphuretted hydrogen and sulphide of carbon; it has been also produced by means of one of the chlorides of carbon. The synthesis of naphthaline necessarily involves the synthesis of the bodies derived from it, and in particular benzine and phenic acid.

The synthesis of these same compounds may be effected by another method, as shown by some experiments made eight years ago (*Annales de Ch. et de Ph.*, 3rd series, xxxiii., p. 295), and which tend to throw a new light on the decomposition of organic substances by heat, and on the general character which the products of this decomposition present. They complete in this respect the results obtained in the dry distillation of the formiates and acetates. These experiments showed that alcohol and acetic acid, submitted to a red heat, furnished a certain proportion of benzine, C_{12} H_6, of naphthaline, C_{20} H_8, and of phenic acid, C_{12} H_6 O_2. The acetic acid may be formed by means of alcohol, the alcohol by means of olefiant gas, which may be prepared from the simple bodies. They give rise then to benzine, naphthaline, and phenic acid. The formation of benzine and of phenic acid from alcohol and acetic acid can be established by other experiments. Thus, bromoform, which results from the action of bromine on alcohol and on acetone, derived from acetic acid, may give birth to benzine. It is only necessary to direct the vapour of bromoform over metallic iron heated to dull redness to effect this result. The proportion formed, however, is very inconsiderable. Phenic acid, or an analogous body, is formed in small quantity when absolute alcohol is heated to redness in sealed tubes, filled only to a fifteenth of their volume. This decomposition requires a temperature approaching that at which glass softens; the tubes must, therefore, be very strong and difficultly fusible. A very large volume of gas is formed, which renders the opening of the tubes dangerous; no trace of carbon is deposited. A small quantity of phenic acid may be also detected in the liquids obtained by the distillation of acetate of soda. If these liquids be mixed with an equal volume of water, and the supernatant oil separated and agitated with a concentrated alkaline solution, upon supersaturating the latter with hydrochloric acid, if the volume of the liquids employed is properly proportioned, a few drops separate which possess the physical and chemical properties of phenic acid.

The formation of benzine and of naphthaline under these conditions appears due to the following circumstances:—Under the influence of an increased temperature, the carbon and hydrogen tend to disunite, and their gradual separation gives rise to more and more stable compounds, in which the carbon predominates; at the same

time the molecule becomes complicated and its equivalent increased. It is thus that the carbide easiest to obtain is the most hydrogenated, and possesses the lowest equivalent, protocarbide of hydrogen, $C_2 H_4$. If it is sought to obtain a carbide less rich in hydrogen, the bicarbide of hydrogen, a gas is obtained, which contains in the same volume 2, or 3, 4, &c., times as much carbon as the preceding: olefiant gas, $C_4 H_4$, propylene, $C_6 H_6$, &c. If it is wished to push the dehydrogenation still further, and to obtain, under the influence of a higher temperature, a quadricarburetted hydrogen (C_2 H), benzine results, $C_{12} H_6$, that is to say, a liquid, the vapour of which contains, in the same volume, three times as much carbon as olefiant gas, and six times as much as marsh gas. Lastly, under the influence of a more powerful dehydrogenation, a carbide is obtained, of which the vapour contains, in the same volume, five times as much carbon as olefiant gas, ten times as much as marsh gas—naphthaline. This, moreover, is not the last term of these complications. We may thus look from another point of view in connecting the phenomena described in this paper. It has been seen that the formation of olefiant gas, $C_4 H_4$, in the distillation of the acetates, is simultaneous with the formation of propylene, $C_6 H_6$, of butylene, $C_8 H_8$, and carbides of the same order. In the pyrogenous products, in coal tar for instance, benzine, $C_{12} H_6$, is accompanied by a whole series of hydrocarbons: benzoene, $C_{14} H_8$, zylene, $C_{16} H_{10}$, cumene, $C_{18} H_{12}$, &c., which present between themselves and to benzine the same difference (n $C_2 H_2$) as exists between olefiant gas and the corresponding carbides. All leads to the idea that the formation of benzine, either at the expense of alcohol or acetic acid, or from coal and other analogous bodies, is due to the same general causes, and accompanied by the same products. This hypothesis, however, requires new verifications, it enlarges the field of synthesis. In fact, phenic acid, naphthaline, benzine, and the analogous carbides, present, towards benzoic acid and the oxygenated essences, the same relations which connect marsh gas and olefiant gas to acetic acid and the alcohols; because naphthaline, benzine, phenic acid, &c., are the ultimate products of the decomposition of benzoic acid and the oxygenated essences, and without doubt it is by the means of these ultimate products of analysis that the synthesis of this order of compounds may be realized.

Be it as it may, the preceding experiments establish the transformation of alcohol and acetic acid into benzine and naphthaline, and consequently the total synthesis of these two carbides of hydrogen.

Distillation of the Butyrates and several other Substances in presence of the Alkalies.—The formation of marsh gas, of olefiant gas, of propylene, &c., in the dry distillation of formiate of baryta and acetate of soda is not a special phenomena of these salts. A great number of other organic substances distilled with the alkalies give similar results; the alkali determines a production of the carbonic acid, and the oxygen is separated in that form, leaving the nascent carbon and hydrogen to remain combined, forming carbides of hydrogen. Among these carbides some are more simple than the body decomposed, as has been long known, and their formation is due to analysis. Others, on the contrary, are more complicated than the original substance, and can not only regenerate it, but even produce bodies of a higher order. Their formation is due to synthesis; they are known from the experiments here described.

To demonstrate this formation more completely, the results obtained in the distillation of the butyrates, of sugar, and of oleic acid are here described. These are essentially analytical ; the last furnishes the best process known for preparing the bromides of propylene and the analogous carbides. The first, on the contrary, analogous to the two others in its final results, presents a more general character, because it gives rise not only to carbides containing less carbon in their formula than butyric acid, such as olefiant gas and propylene, but also to carbides, which contain an equal or superior amount, such as butylene and amylene. Butyric acid, $C_8 H_8 O_4$, may be formed either by the oxidation of butylic alcohol, $C_8 H_{10} O_2$, derived itself from butylene, or by the transformation of the hydrocyanic ether of propylic alcohol, formed from propylene. Now, butylene and propylene are produced in the distillation of the acetates, and acetic acid can be formed by means of alcohol derived from olefiant gas; we are thus led to admit that butyric acid, and consequently the pyrogenous carbides which it forms, can be synthetically formed entirely by means of the simple bodies of which it is constituted. These carbides can then again, in their turn, form alcohols and acids more complicated than butyric acid. Thus, starting from the simple bodies, synthesis is enabled to build up, by successive degrees, organic compounds of an order more and more complicated.

Pure butyrate of baryta, and also butyrate of lime, were submitted to dry distillation, sometimes alone and sometimes mixed with an equal weight of iron or of soda-lime. The results were most neatly obtained in the presence of the soda-lime, but this condition was not favourable to the formation of butylene and amylene. Experiment showed that to obtain these bodies it was preferable to distil the butyrate of baryta alone. The apparatus used was analogous to that employed in the former cases: a stone retort, two cooled flasks to condense the liquids, a flask holding sulphuric acid diluted with its own volume of water, an eprouvette containing bromine under water, a washing bottle containing soda, a flask filled with boiled, absolute alcohol, intended to dissolve the carbides analogous to marsh gas.

The gases dissolved by the alcohol consisted of equal volumes of marsh gas and hydride of ethyle. Some hydride of propyle might, however, have been present, because this gas, mixed with its own volume of marsh gas, gives the same eudiometric results as hydride of ethyle.

The neutral bromides of the hydrocarbons formed were separated as usual and submitted to a series of fractional distillations, by which were obtained:

1. A trace of a bromide mixed with water, boiling below 130°.
2. Bromide of olefiant gas, boiling at 130°.
3. Bromide of propylene, boiling at 145°. This product was more abundant than all the others.
4. Bromide of butylene, boiling at 160° and a little above.
5. Bromide of amylene, boiling between 175° and 180°.
6. A mixture of non-volatile of bromides, which appeared to belong to the hydrocarbons, more complicated than amylene.

The first five products were decomposed, and the gases analyzed as in other cases.

The decomposition by heat of the bromides less volatile than that of amylene prevented their separation and purification in the same manner. They were, therefore, converted into the more volatile monobromides, bodies which boil 60° or 80° C. below the original compounds, by mixing them first with absolute alcohol, then with potash, and gently distilling, precipitating the distilled product with water, and again fractionizing. The products, however, were too small to be examined. Several experiments were made to deoxydize butyric acid by other processes than the employment of alkalies. Those only which furnished any results consisted in passing this acid over iron heated to a dull redness, which furnished principally olefiant gas and propylene; and in treating with nascent hydrogen, a bromide derived from butyric acid. This latter body is obtained by heating to 100° for 200 hours in a thick, sealed flask, a mixture of 1 part of butyric acid and 15 parts of perbromide of phosphorus, and then distilling the products. Between 185° and 190° a peculiar liquid passes over, of which the composition resembles a butyric tribromide, $C_8 H_7 Br_3$, derived from butyric acid by substitution of bromine for oxygen. An endeavour was made to replace the bromine in this compound by hydrogen. As this body is decomposed by water, it was heated in sealed tubes to 275° with polysulphide of hydrogen and copper. The gas so formed consisted of hydrogen mixed with a few hundredths of hydride of butyle, $C_8 H_{10}$.

Distillation of Oleic Acid.—The formation of hydrocarbons in the distillation of organic substances, in presence of the alkalies, results from very general causes, and, so to say, independent of the nature of the substance decomposed. This formation, therefore, may be observed under the most varied circumstances, and at the expense of the most diverse bodies. The analytical nature of these phenomena is already well known to Chemists. To results of this class may be added some others more particularly intended to furnish an easy and certain means for preparing considerable quantities of the bromides of propylene, butylene, amylene, and analogous carbides. Among the several processes for the preparation of these bodies, the following appears the easiest and best:—

One kilogramme of oleic acid of commerce is mixed with 300 grammes of slaked lime, then the oleate so formed with 300 grammes of soda-lime. In default of oleic acid, the crude lime soap obtained with ordinary oil may be employed. The mixture is introduced into a stone retort of two litres' capacity; to this is adopted, 1st, a series of two or three flasks of 1 litre, carefully cooled; 2nd, a flask of 1 litre, containing sulphuric acid diluted with its own volume of water; 3rd, two eprouvettes, the one containing 750 grammes of bromine and 100 of water, the other, 250 grammes of bromine and 100 of water—the first should be surrounded with cold

water; 4th, a flask of 1 litre, containing soda solution diluted with its own volume of water. The retort is carefully heated, when the products begin to pass over. In about two hours the distillation is finished. The bromine contained in the first eprouvette is completely decolorized and converted into bromides. The contents of the two eprouvettes are mixed together and agitated with a diluted solution of caustic soda; then washed several times with water, and set aside. The distillation of the oleate of lime is then repeated twice more, and, from the 3 kilogrammes of oleate of lime and 3 kilogrammes of bromine thus employed, 2 kilogrammes of liquids condensed in the two first flasks, and 1200 grammes of bromides of the hydrocarbons are ultimately obtained. These 1200 grammes, submitted to a systematic series of fractional distillations, furnish in a state of purity 600 of bromide of propylene, 100 of bromide of olefiant gas, 100 of bromide of butylene, 50 of bromide of amylene, and 200 to 300 grammes of bromides not volatile without decomposition.

The process for the preparation of these bromides by means of oleic acid, furnishes more satisfactory results than any other method, and certainly more so than the distillation of solid fatty bodies with alkalies, or the decomposition of amylic alcohol at a red heat.

Distillation of Sugar.—The formation of the carbides of hydrogen in the distillation of sugar with alkalies, presents particular interest. In fact, sugar stands entirely apart, in its properties and composition, from the fatty acids and the several bodies employed in the preceding experiments: it is one of the most essential and complex products of vegetable organization. Its centesimal composition, however, may be represented as carbon united with the elements of water, thus resembling acetic acid. It gives rise to analogous carbides, but in much less quantity. The operation was conducted in the same manner as those previously described, the sugar or glucose being mixed with its own weight of soda-lime. Bromides of olefiant gas, propylene, and butylene, were obtained and separated. If glucose is employed, the operation is much more difficult, in consequence of the first action which the alkali exerts on this body. The production of olefiant gas in the distillation of sugar gives rise to a curious observation. Until now, sugar could only be converted into alcohol by fermentation. This body, however, is readily formed from olefiant gas; consequently, alcohol may be obtained from sugar without having recourse to fermentation.

Résumé.

Up to the present time the carbides of hydrogen have always been formed by the destruction of pre-existing organic compounds. In this destruction, generally effected under the influence of heat, the elements of the compound are divided into two unequal portions; one portion of the carbon and hydrogen being completely burned at the expense of the oxygen, while the other portion of the elements are separated in the form of principles more combustible than the original body. These principles are generally more simple, not only in composition but also in the number of equivalents of carbon contained in their formula. This change, however, is purely analytical; it does not permit the accomplishment of the first step of synthesis and the formation of any of the carbides of hydrogen, because it presupposes the existence of the combinations of carbon with hydrogen, which is precisely what it is intended to effect. It is easy to prove this by recalling the processes now employed by Chemists in the preparation of the carburetted hydrogens. Thus, marsh gas was at first extracted from the products of the spontaneous decomposition of vegetable débris, afterwards formed by decomposing organic substances, particularly the acetates, with heat. Olefiant gas, formed in the dry distillation of a great number of organic substances, is generally prepared with ordinary alcohol, produced by fermentation from sugar. As to propylene, butylene, amylene, and analogous carbides, they are prepared either by means of the corresponding alcohols, or by the dry distillation of a great number of salts, all more complicated than the resulting carbides. All these carbides belong to one series, all contain equal equivalents of carbon and hydrogen, but are more and more condensed. Naphthaline and benzine do not belong to this series, but, like the preceding, are only prepared from organic substances. It may be seen from all these cases that the formation of the hydrocarbons resulted, until now, from analytical phenomena, from a partition, in consequence of which the elements of a complex organic substance are grouped into more simple compounds. In the researches which are now described an entirely

opposite course was pursued, and the synthesis of the carburetted hydrogens and alcohols realized.

Marsh gas may be formed by the distillation of formiate of baryta, which has been produced with the oxide of carbon extracted from carbonate of baryta. It may also be produced by means of sulphide of carbon. Olefiant gas is also formed in the distillation of formiate of baryta, and may be obtained from sulphide of carbon. Propylene is formed in the distillation of formiate of baryta. Butylene and amylene are formed in the distillation of acetate of soda, which is derived from the alcohol formed by means of the olefiant gas prepared by the preceding process. Naphthaline is formed by means of sulphide of carbon, by means of alcohol, and also of acetic acid.

Benzine is formed by means of alcohol or acetic acid, which may be prepared from olefiant gas.

The starting-point of the synthesis of organic compounds is thus assured—it remains to convert these carbides into oxygen compounds; that is to say, to reverse the ordinary conditions of the production of these carbides. This has been effected, and the corresponding alcohols obtained.

Until now, the various alcohols were produced by several processes from compounds more complicated than themselves, and to which they were not connected by any general and regular relation. Thus, methylic alcohol or wood-spirit was found among the numerous products of the distillation of wood, an organized vegetable substance. Ordinary alcohol is a normal and regular product of the fermentation of sugar; its only source, therefore, being an immediate principle selected from the vegetable kingdom. The amylic, butylic, and propylic alcohols were the accessory, if not accidental, products of fermentation. Caprylic alcohol was formed in the distillation of castor oil in the presence of alkalies. Ethalic, cerylic, and melissic alcohols were formed by means of spermaceti and certain kinds of wax, which result from the combination of the fatty acids with these alcohols.

For these various and analytical processes are substituted direct and regular general methods, which enable the alcohols to be formed by means of the hydrocarbons. Thus methylic alcohol has been formed with marsh gas by replacing an equivalent of hydrogen by chlorine and decomposing the hydrochloric, methyl-ether so formed, by potash. Vinic and propylic alcohols have been formed by combining olefiant gas and propylene with sulphuric acid, and then decomposing this combination with water. The elements of water remain united to the hydrocarbon. Lastly, the propylic, amylic, caprylic, and ethalic alcohols, and probably all the others, can be obtained by means of their hydrochloric, hydriodic, or hydrobromic ethers which result from the union of the hydrogen acid with the carbides of hydrogen corresponding. The total synthesis of all the alcohols, the corresponding hydrocarbons of which have been produced from the simple bodies, is thus realized. These alcohols have now become, owing to the labours of modern Chemists, the starting-point of the majority of other organic compounds. To realize the total synthesis of the carbides of hydrogen and the alcohols is then to effect the synthesis of an almost infinite number of organic compounds, natural as well as artificial, by means of the simple bodies which enter into their constitution.—*Extracted from the Annal. des Chim. et de Phy.*

THE USE AND PROPERTIES OF PERCHLORIDE OF IRON.

In answer to several correspondents on this subject, we subjoin the following, which has appeared in the medical journals:—

"The solution of this persalt is now almost universally employed to arrest arterial or venous hæmorrhage, resulting either from accident, or as a consequence of surgical operations. It has also been found useful in intestinal hæmorrhage; in one case in particular, M. Demarquay, of Paris, administered, morning and evening, enemata of seven ounces of fluid, with twenty drops of the concentrated solution of perchloride of iron, and a tablespoonful of the perchloride syrup (five or six drops to the tablespoonful), where the hæmorrhage from the bowels was considerable, and had resisted the ordinary remedies. The result was extremely satisfactory. The same surgeon relates a second case of extensive abscess of the shoulder, where an injection of iodine caused severe hæmorrhage. This was arrested by throwing into the sac a lotion composed of seven ounces of water and ten drops of the perchloride.

"In gonorrhœa and leucorrhœa, injections of the perchloride have been tried with success in weak and lymphatic subjects, the proportion of the perchloride being twenty drops to three ounces and a half of water."

"As a Hæmostatic.—1. As a local or external hæmostatic, 3 to 5 parts chloride of iron to 100 parts of distilled water. Lint soaked in this mixture is to be applied with more or less pressure on the seat of hæmorrhage. 2. As an internal hæmostatic, 1 part of chloride of iron to 500 of distilled water, sweetened to taste. One tablespoonful to be given every hour, or oftener if necessary. This formula suffices to check the fiercest hæmorrhage within twenty-four hours. The same formula, without sugar, forms a useful uterine injection or astringent lavement in cholera or colliquative diarrhœa. 3. A hæmostatic and resolvent ointment is composed of 4 to 15 parts of chloride of iron to 30 of axunge."

In a letter in the *Medical Gazette*, Aug. 27th, Mr. J. Zachariah Lawrence states that having, a few months ago, drawn the attention of the profession to the powerful local styptic properties of the *solid* perchloride of iron, he has since that time found a superior method of employing it. "If the solid perchloride of iron be kept in a bottle, a small portion of it after a time deliquesces into a thick brown fluid, which is constantly kept in a state of super-saturation by the undeliquesced portions of the salt. This liquid, applied by means of a spun-glass brush to a bleeding surface, arrests the bleeding almost instantaneously. This mode of application is particularly valuable in applying the styptic to such cases as excision of the tonsils, bleeding from the deeper-seated gums, &c."

PROCESS FOR ASCERTAINING THE PROPORTION OF QUININE IN CINCHONA BARK.

This process, published by M. Guillermond in the *Gazette Médicale* of Lyons, is a modification of one already published by the same writer in 1847. The following is the process:—Take twenty grammes of yellow bark, powder it without leaving any residue, and pour upon the powder alcohol at 76°, in sufficient quantity to form a soft paste, which is to be heated for a few minutes until the fibre is thoroughly penetrated by the liquid; then introduce into the paste ten grammes of hydrated lime in fine powder; mix thoroughly, so as to form a homogeneous mass, which is to be heated on a plate until all humidity is completely eliminated. This powder is afterwards to be treated with 100 grammes of rectified sulphuric ether, which will dissolve and remove all the quinine. This ether is then to be rapidly evaporated at the heat of boiling water, and the residue will contain only the quinine and a small proportion of a yellow colouring matter, which may be neglected. In order to determine the quantity of quinine obtained, either of the three following methods may be adopted:—

1. Dry completely the ethereal residue. Its weight will give that of the quinine, plus the portion of colouring matter, the quantity of which is insignificant. 2. Dissolve the residue in a little alcohol and acidulate it with very dilute sulphuric acid, the saturating power of which for quinine is ascertained. For this purpose a graduated tube may be employed, so that a given quantity of the dilute acid corresponds to one gramme of quinine. 3. Weigh the sulphate of quinine which is obtained. It may be dried in a few moments by exposing it to the sun or to the heat of a stove.

This process, according to M. Guillermond, is recommended by its simplicity, and the celerity with which the result is obtained, for only about three hours are required in the operation; and the plan possesses the additional advantage of separating completely the whole of the alkaloid.—*Brit. and For. Med. Rev., from Bull. Gen. de Thér. Oct. 30th*, 1858.—*American Journal of Pharmacy.*

GLYCERINE OINTMENT FOR THE ITCH.

M. Bourguignon, so well known in Paris by his successful researches on "the acarus scabiei," has published in the *Gazette Médicale* the following formula. One general friction, not preceded by soap ablutions, is sufficient:—Yelks of two eggs; essence of lavender, lemon, and mint, of each seventy-five drops; essence of cloves and cinnamon, of each 120 drops; gum tragacanth, half a drachm; well pounded sulphur, twenty-six drachms; glycerine, thirty-two drachms. Total weight, nearly eleven ounces. Mix the essences with the yelks of egg, add the gum tragacanth,

make a good mucilage, and then add very gradually the glycerine and sulphur. Many cures have been obtained by this preparation, which has the advantage of giving no pain. The well-known Helmeric ointment being really useful, M. Bourguignon has modified it, and substituted glycerine for the axunge. In the altered form the preparation is not any dearer, as efficacious, and less painful than the original ointment. It does not grease the clothes, and has an agreeable perfume. Gum tragacanth, fifteen grains; carbonate of potash, thirteen drachms; well pounded sulphur, twenty-six drachms; glycerine, fifty-two drachms; essence of lavender, lemon, mint, cloves, and cinnamon, of each fifteen drops. Total weight, nearly eleven ounces: make a mucilage with the gum and one ounce of glycerine, add the carbonate, mix until it is dissolved, and then gradually add the sulphur and glycerine; lastly, pour in the essences. With this compound, M. Bourguignon advises two general frictions of half an hour, within twelve hours of each other, and followed, twenty-four hours afterwards, by a simple warm bath, as the glycerine is soluble in water. Two-thirds of the preparation should be used for the first friction, the other third for the second.—*Lancet.*

TREATMENT OF TETANUS BY THE WOORARA POISON.

M. Vella, of Turin, arguing from the fact shown by M. Bernard, in 1850, that the woorara poison is a direct sedative of the motor nerves, undertook a series of experiments which clearly showed the antagonism between strychnine and woorara. Being appointed to the French Military Hospital of Turin during the late campaign, and seeing several cases of tetanus which had resisted opiates, ether, &c., M. Vella resolved to try woorara. The first trials were made upon two patients who had been suffering from tetanus for four and five days respectively, in consequence of gun-shot wounds. They were both in a semi-asphyxiated and desperate state. The woorara produced a general relaxation of the muscular system, whereupon the patients felt much relief; but they both died. The same treatment was, however, employed upon a third patient, who recovered. He was a sergeant, thirty-five years old, tetanic from a gun-shot wound of the foot. Two grains of woorara were dissolved in nine drachms of water, and compresses moistened with the solution were applied to the wound; the strength being gradually increased to fifteen grains in fourteen drachms of water. For the first four days the compresses were renewed every third hour; afterwards every fifth hour, up to the twelfth day, when the changes were reduced to three and two in the twenty-four hours. In twenty-two days the patient could leave his bed, and returned to France thirty-six days after the first application of the woorara.—*Lancet.*

EFFECTS OF CHLOROFORM ON BEES.

Mr. Annan, builder, Downfield, wishing to have honey taken from a hive without killing the bees, and having before heard of chloroform being used, felt anxious to try the experiment. He first closed the doorway, then covered the hive with a cloth to shut out the light as much as possible, after which he commenced to blow chloroform into the hive. When it was discovered that the bees had fallen asleep. they were easily removed to another hive without harm to anyone, and next morning were all awake and in a lively state, humming around their hive.—*Dundee Advertiser.*

BOTANICAL PRIZE.

A prize of £100 has been placed at the disposal of the Council of the Society of Arts, by Sir W. C. Trevelyan, Bart., to be awarded for "the best Essay on the Applications of the Marine Algæ and their Products, as Food or Medicine for Man and Domestic Animals, or for Dyeing and other Manufacturing Purposes."

BAD QUALITY OF GLASS.

We are requested to call the attention of our Members, and Chemists in general, to the quality of the flint-glass used by several manufacturers of bottles, the use of which by Chemists is attended with serious inconvenience. From its gradual decomposition the excess of alkali contained in this glass effloresces on the surface, and acts chemically on many substances, particularly on hydrocyanic acid, which it speedily blackens. After the most careful cleaning of the surface of the bottles made with this glass, they gradually become dull, and give the appearance of dirty bottles having been employed.

POISONING BY STRYCHNINE GIVEN IN PLACE OF SANTONINE.

Dr. Simons, of Alken, in Belgium, has just had the misfortune of seeing a child of seven years perish, to whom he had given santonine (as he thought) as a vermifuge. On examination of the bottle from which the powders had been prepared, it was found that, though labelled santonine by M. Degheest, the wholesale druggist who had delivered the bottle, the latter contained a powder composed of one-sixth of santonine and five-sixths of strychnine. The Court before whom this sad affair was brought decided that the heaviest penalty should be inflicted upon M. Degheest and his assistant, as their warehouses were found in a most irregular and dangerous state as regards poisonous substances. Dr. Simons, though evidently guiltless, was lightly fined, as, according to the letter of the law, he was bound to examine and test the medicinal substances he received from the wholesale druggist. It is, however, perfectly plain to every one, that the busy country practitioner cannot find time for such investigation, besides not being sufficiently accustomed to the necessary manipulations.—*Dublin Medical Press.*

SUICIDE BY OXALIC ACID.

An inquest was held on Thursday, Sept. 1st, at the Chelsea Workhouse, on the body of Mary Newnes, a married woman, aged 32, who for the last thirteen years had been in the service of the late Dowager Countess of Norbury, and whose husband was the countess's coachman. Since the death of her mistress, to whom the deceased was very much attached, she had been in a desponding way, and on Tuesday last she was found suffering from the effects of oxalic acid, from which she shortly afterwards expired. Verdict—Temporary insanity.

SUICIDE BY STRYCHNINE.

On Thursday, September 15th, Robert G. Visick, of Brighton, committed suicide by taking strychnine. The deceased was formerly in business as a Chemist. On the day above mentioned his son went to his room, and deceased told him he had taken something to destroy himself. Dr. Davies was sent for, who deposed :—"I found him strongly convulsed with every symptom of tetanus. I inquired of Mrs. Visick what it was. At first she told me she did not know, but afterwards said he had taken poison. I inquired what poison. She made no reply, which I attributed to her distress of mind. I then said to deceased, 'What poison have you taken?' He replied, 'Strychnine.' I then asked him how much, but he said he could not tell. Death shortly afterwards ensued." Evidence was given that deceased had been labouring under mental distress, and a verdict of "Temporary insanity" was returned.

BELLADONNA FRUIT MISTAKEN FOR BLACKBERRIES.

Last week, some children belonging to the town of Sevenoaks went out blackberry gathering, and one of them, a lad about ten years of age, was induced to eat some berries which he found growing in Knole Park, and which proved to be the belladonna, or deadly nightshade, one of the most dangerous of the "narcotico-irritant" class. The poisonous effect of the berries soon became visible, and shortly after his arrival home he appeared in a state of extreme intoxication. This was afterwards followed by great delirium and total blindness, although the eyelids were widely extended, as if in earnest gaze. For some time his life was despaired of, but owing to the unremitting attention of the parish surgeon, the lad is going on favourably, although still in a precarious condition.—*South-Eastern* (*Maidstone*) *Gazette,* and *Lancet*, Sept. 10th.

OBITUARY.

DEATH OF PROFESSOR HENFREY.

It is our melancholy duty to record the death of this gentleman, at his residence at Turnham Green, on the morning of the 7th of September. Prof. Henfrey has long been known as an excellent histologist and sound vegetable physiologist. Especially conversant with the botanical literature of the Germans, it has been to his pen that we owe many valuable dissertations upon subjects little attended to in England. The papers in the *Micrographic Dictionary* by himself and his friend Dr. Griffith are justly celebrated for their accuracy as well as skilful condensation. The

physiological part of his *Elementary Course of Botany*, and the papers on vegetable structure now in course of publication in the *Journal of the Royal Agricultural Society*, will always be regarded as the productions of one who was not only familiar with the truths of science, but able to render them attractive to those who are little accustomed to think upon those subjects. In private life he was endeared to his friends by the gentleness of his manners and the genuine kindness of his nature; while to his young family his loss is irreparable. Professor Henfrey was a Fellow of the Royal and Linnean Societies, a Member of the Council of the Horticultural Society, Professor of Botany in King's College, London, and Examiner in Natural Science to the Royal Military Academy and the Society of Arts. He died in the thirty-ninth year of his age.—*Gardeners' Chronicle and Agricultural Gazette.*

TO CORRESPONDENTS.

The Dispensing and Sale of Poisons.—*Mr. Smeeton* (Leeds) calls attention to a letter in the *Lancet*, Sept. 10th, on this subject, in which a case is related of a Physician ordering atropine, tincture of aconite, and soap liniment, as an embrocation, and chloroform and hydrocyanic acid to be taken as drops. Our correspondent thinks the case given applies to the prescriber rather than the dispenser. This is obvious, and it is rather strange that a Surgeon should require some legislative enactment to restrict the prescribing of poisons by a Physician.

Oxford Middle-class Examination.—We see with much pleasure that Mr. Hooper Tolbort, an apprentice of Mr. Froud, of Dorchester, stood at the head of all the candidates for honours. We gladly give publicity to this fact, as an indication of what may be accomplished by the diligent application to study in spare hours.

Ammonia from the Waste Gases of the Vitriol Chamber.—*Mr. C. Griffin* (Leamington Priors) states, in reply to Mr. Tanner's claim, that he has searched the list of patents from the earliest period, and cannot find any patent in the name of Tanner for making ammonia from the nitrogen of vitriol works, or for anything relating to that manufacture. He also thinks that Mr. Tanner should have given his address.

J. B. (Islington).—(1.) We know of no formula for ointment of chloride of zinc. (2.) No.

A. P. S. (London).—(1.) Chloroform, ℥j., in a prescription, would be one ounce by measure. (2.) No particular scent is intended.

R. G. (Grantham).—*Sumbul.* Vol. xi., page 358, and vol. xv., page 508.

A Registered Apprentice (Bradford).—*Latin Pharmacopœia, Selecta è Prescriptis.* Fownes's *Manual of Chemistry*, Royle's or Pereira's *Materia Medica*, Balfour's *Manual of Botany.*

M. J. F. (Devonport) should apply by letter to the Secretary, 17, Bloomsbury Sq.

A Victim (Newcastle) sends us a copy of Chapman's *Veterinarian's Pharmacopœia*, price 2*s.* 6*d.*, from the character of which he considers himself victimized in having made the purchase, and wishes to caution others.

B. (Manchester).—(1.) The conditions relating to the Botanical Prize will be found in the April number of this Journal, page 501. (2.) Apply by letter to the Secretary, 17, Bloomsbury Square. (3.) Unless equivalent proportions are used, the precipitate is re-dissolved.

M. G. (Kennington).—Probably the seed of a species of palm; but the specimen sent is too imperfect to enable us to speak positively.

A Member (London) wishes for formulæ for "Crocy's Acid Nitrate of Silver," and "Boinet's Iodized Bread."

M. (London).—*Iodizing Solution.* Vol. xviii., page 200.

Syr. Ferri Iodidi.—The author of a paper on this subject, signed E. S., is requested to communicate his name to the Editors. The paper is considered suitable for publication with the author's name.

J. F. T. (Birmingham), *G. W.* (Brighton), and *M. P. S.* (West Ham), in our next.

Erratum.—Page 194, line 23 from top, *for* Hy Cl, *read* Hg Cl.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. V.—NOVEMBER 1st, 1859.

THE STATE OF PHARMACY IN IRELAND.

In another part of this Journal will be found a letter addressed to the Governor and Company of the Apothecaries' Hall of Dublin by Mr. John Grattan, of Belfast, on a subject which our readers on this side of the Channel may have some difficulty in fully comprehending without further explanation than is there given of the state of Pharmacy in Ireland, and of the controversy which has existed for some months between the Irish College of Physicians and the legal representatives of Pharmacy in that country. In Ireland, the exercise of the art of Pharmacy, as a profession, is entrusted by the Legislature exclusively to those who have received a licence from the Company of the Apothecaries' Hall of Dublin, and who style themselves Apothecaries. Druggists are mere dealers in Drugs, and are not empowered to dispense medicines. The Irish Druggist, therefore, is not a Pharmaceutist, he differs entirely from the Chemist and Druggist in this country, being restricted from the exercise of the art of Pharmacy. The Irish Apothecaries, since the year 1791, have been the only legally recognized Pharmaceutists. In the first instance they were very nearly what the Pharmaceutical Chemists now are in England, excepting that in addition to their being legally recognized as the qualified dealers in, and dispensers of, medicines, they were on the one hand invested with the exclusive right to dispense Physicians' prescriptions, and on the other hand they were not restricted from the practice of medicine, which in a subordinate degree, and usually subject to the directions of the Physician, had always formed part of the duties of the Apothecary. This at least has been the construction put upon the law affecting Apothecaries in Ireland. In 1791, an Act was passed "for the more effectually preserving the health of his Majesty's subjects, for erecting an Apothecaries' Hall in the city of Dublin, and regulating the profession of an Apothecary throughout the kingdom of Ireland." This Act is known as the Apothecaries Act of Ireland, and by it the exercise of the art of Pharmacy is governed in that country. It provides for the establishment of a "company or fraternity of judicious Apothecaries well skilled in preparing and compounding of medicines," and for the erection of a Hall, "amply supplied with medicines of the purest quality, prepared under the inspection of persons well skilled in the art and mystery of such preparations." The Company was to consist of subscribers, being Apothecaries resident in the city of Dublin or within the suburbs or liberties thereof, who should subscribe one hundred pounds each, and the number of whom should not exceed sixty. The sum thus subscribed was to be applied for the establishment of the Irish Apothecaries' Hall, and the Company was to be called "the Governor and Company of the Apothecaries' Hall of the city of Dublin." The Act, however, not only contemplated the establishment of "an Apothecaries' Hall," it was also to regulate the profession of an Apothecary throughout the kingdom of Ireland. It therefore, states,

And in as much as many dangerous and fatal consequences have heretofore arisen from the practice of taking as apprentices to the art and mystery of an Apothecary,

boys or persons disqualified by the want of proper education, to prepare or vend medicine, not being capable of learning their nature, difference, effects, and qualities, to the imminent hazard of the lives of his Majesty's faithful and loyal subjects, be it enacted by the authority aforesaid, that from and after the twenty-fourth day of June, in the year One thousand seven hundred and ninety-one, no person or persons shall be received, taken, indented, or employed as an apprentice, foreman, or shopman to any Apothecary throughout the kingdom of Ireland, until he or they shall be examined by the governor or deputy-governor and directors of the Apothecaries' Hall of Dublin, any five to make a quorum, who are hereby authorized and required to examine into the education and qualifications of such person or persons who shall apply to them for that purpose, and the majority of such examiners are hereby authorized and empowered after such examination to certify that such person or persons so applying to them, as shall appear to such examiners properly qualified to become an apprentice or apprentices, journeyman or journeymen, to learn or transact the business of an Apothecary, in the manner or to the effect following, that is to say:

"To all to whom these presents shall come greeting, know ye, that we the governor, deputy-governor, and directors of the Apothecaries' Hall of Dublin, have this day duly and carefully examined A. B., the son of C. D., of, or late of [as the case may be], in the county of , and we think him properly educated or qualified to become an apprentice or journeyman [as the case may be], to learn or transact the business of an Apothecary, and we do hereby certify the same. Given under our seal, the day of , in the year of our Lord ."

In the event of a candidate for this certificate being rejected, the Act specifies that he may present himself again for examination after a lapse of six months, and if he be a second time rejected, he may appeal to a general council of the Company, or to the subscribers at large.

The Act also provides for the examination of all those who should thereafter commence business as Apothecaries in Ireland. It says:

And be it further enacted by the authority aforesaid, that from and after the twenty-fourth day of June, in the year of our Lord One thousand seven hundred and ninety-one, no person shall open shop, or act in the art or mystery of an Apothecary within the kingdom of Ireland, until such person shall have been examined as to his qualification and knowledge of the business by such persons and in such manner as herein before mentioned and required for the examination of persons applying to become apprentices or shopmen; which examiners shall take the oath before mentioned in manner as herein before required, and shall grant or refuse to the person so applying, a certificate to open a shop, or follow the art and mystery of an Apothecary, within the kingdom of Ireland, with the like remedy of appeal as herein before mentioned.

The same appeal is here provided for as in the case of apprentices and shopmen, but in addition to this, the candidate for a licence to open shop, if rejected by the examiners and by the general council or subscribers at large, may, if he think fit, appeal, within eight days, to the King and Queen's College of Physicians in Ireland, who shall examine him, and may reverse the decision of the Apothecaries' Hall, and grant a certificate, which "shall be as good, valid, and effectual in law" as the other. The examinations are to be open to all Apothecaries who may wish to be present. There are clauses specifying that no Apothecary in Ireland shall take an apprentice for a shorter term than seven years, nor take an apprentice or shopman without a certificate, nor open shop without having been duly examined and licensed, subject to a penalty in either case of twenty pounds, to be recovered by the Governor and Company of the Apothecaries' Hall of Dublin, and applied to the use of the said Company. There is also a clause specifying that no Apothecary in Ireland "shall grind, compound, sell, or keep any arsenic, oils or colours for painters' use, in the shop or room wherein he compounds medicines," under a penalty of five pounds.

The only exemption from the application of the provisions of this Act are as follows:—

And provided also, that nothing herein contained shall extend or be construed to extend to any apprentice or shopman, or Apothecary's foreman, or owner of the shop, or manager in or about the business of an Apothecary as aforesaid, who shall appear to have been really and *bonâ fide* taken, received, indented, or hired, or to have opened shop before the passing of this Act.

No mention is made throughout the Act of Chemists and Druggists as having anything to do with the dispensing of medicines; it seems to have been assumed that this duty belonged entirely to the Apothecary; indeed, the term Druggist occurs only in a clause at the end of the Act, relating to the sale of arsenic, where it states that "every Apothecary, Druggist, or other person selling any quantity less than one pound weight of arsenic," shall enter the sales in a book, with the names of the persons purchasing the same.

It is obvious from the provisions and general wording of this Act, that it was intended for the regulation of the practice of Pharmacy in Ireland, with the view of ensuring to the public a supply of good and pure medicines, and a class of men qualified and capable accurately to dispense the prescriptions of medical men, as well as otherwise to supply the public with the medicines they required. There is no reference anywhere in the Act to the requirement by the Apothecary of a qualification to practise medicine, or of any other qualification than that involved in the preparation, dispensing, and sale of medicines. So much is this the case, that any one reading the Act, and having no other means of judging, would conclude that the Irish Apothecary was a Pharmaceutist and nothing else. That the sole object of the Act was, at the time of its passing and long afterwards, understood to be what we have represented, is further proved by the conduct of those by whom the law was carried into effect. The Act does not specify what was to be the nature of the examination by which the qualification of Apothecaries should be tested. This was left to the Apothecaries themselves, the examining body, and by them it was decided that the examinations should be confined to Chemistry, Pharmacy, Materia Medica, and Botany, precisely the subjects comprised in the examinations of the Pharmaceutical Society of Great Britain. For nearly fifty years after the passing of the Act it was carried out in the spirit of a Pharmacy Act. Our correspondent, Mr. Grattan, became a Licentiate in 1823, after passing an examination in the four subjects named above, and even so late as the year 1838 the certificate issued by the Company was in the following words:—

To all to whom these presents shall come greeting, know ye, that we, the governor, deputy-governor, and directors of the Apothecaries' Hall, Dublin, have this day duly and carefully examined A. B. in Chemistry, Pharmacy, Materia Medica, and Medical Botany, &c., and we think him properly qualified to commence the profession of an Apothecary, and we hereby certify the same. Given under our hands, &c.

Up to this time the Irish Apothecary was not required to possess any qualification for practising as a medical man. His certificate was a licence to *open shop* and carry on *business* as an Apothecary, and his qualification was confined to subjects relating to practical Pharmacy. But with the example of the English Apothecaries before them, with an Act of Parliament of a very elastic character, in which there is no definition, except by inference, of what an Irish Apothecary should be, with a complete monopoly of all the dispensing business of the country, and with no restriction, as they conceived, to the acquirement, in addition to this, of a fair share of medical practice, the Apothecaries in Ireland have been tempted and drawn away from their legitimate calling, and now claim to be as completely Medical Practitioners as those who bear the same name in England. It is this claim, which has

been brought more prominently into notice in connexion with the working of the new Medical Act, that has called forth from the King and Queen's College of Physicians in Ireland a "Statement," in which they say—

This being the first occasion on which this claim has come before the College in an official and authentic shape, the President and Fellows consider it their duty formally to expose the groundless nature of a pretension which, if sustained, would, they feel convinced, prove detrimental to the interests, not only of the profession of Medicine, but of the art of Pharmacy, in Ireland."

They further say—

The President and Fellows are too sensible of the great advantages to the profession and the public which a special class of Pharmaceutists in Ireland secures, to desire that the monopoly of the Apothecaries' Hall of Dublin, as regards the qualifying of Pharmaceutists, should be removed; and they therefore cannot but approve of Section 55 in the Medical Act, which secures to the Company a continuance of that exclusive privilege. It is, however, with regret that they deem it their duty to observe, that the Company of the Apothecaries' Hall of Dublin, in its ambition to assume the province of a body qualifying in Physic, has practically discountenanced the pursuit of Pharmacy, the object of its incorporation, not only by compelling the candidates for its certificates to complete a course of education, and undergo an examination, in which anatomy, the science and practice of medicine and surgery, are prominent subjects, but, by not requiring apprentices to serve for a longer time than three years—a regulation which, while it acts as a discouragement to the practice of Pharmacy, is in effect a violation of the Act of Parliament, which requires a seven years' apprenticeship, and is incompatible with the oath which every Apothecary takes upon his admission into the Company as a shareholder.

It is important to observe carefully the marked distinction that exists between the London Apothecary and the Apothecary of Dublin. By the Act 55 Geo. III., chap. 194, the Master, Wardens, and Society of Apothecaries of London are expressly authorized and required to examine all persons applying to them—"who, in addition to an apprenticeship of five years, had previously produced testimonials of a SUFFICIENT MEDICAL EDUCATION (Sect. 15), for the purpose of ascertaining the skill and ability of such in the SCIENCE AND PRACTICE OF MEDICINE" (Sect. 4); and to license them accordingly: provided that nothing in the Act shall affect Chemists and Druggists in the buying, preparing, compounding, dispensing, and "vending of drugs, medicines, and medicinal compounds, wholesale and retail" (Sect. 28).

It is almost superfluous to repeat that no such power has been conferred upon the Apothecaries' Company of Dublin. Persons possessing its certificate are qualified only in the "art and mystery of an Apothecary;" for general purposes they are Pharmaceutists, being somewhat similar to the Chemist in England. But the Legislature has passed no enactment which would support the assumption of the Company that the certificate of that body confers upon its possessor a statutable right to practise Physic.

The reply to this Statement, signed by the Secretary on behalf of the Governor and Company of the Apothecaries' Hall of Dublin, is the document to which Mr. Grattan's letter particularly refers. The subject is one of considerable importance, involving as it does the character of the Pharmaceutical profession in Ireland, and it cannot be devoid of interest to the Members of the Pharmaceutical Society of Great Britain. If the Apothecaries in Ireland are determined to follow the example of those who bear the name in England, and, relinquishing Pharmacy as their special calling, become General Practitioners in Medicine and Surgery, it will become necessary to provide for the proper exercise of the art of Pharmacy there through the medium of some other body than that to which it is now entrusted.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *5th October*, 1859,

Present—Messrs. Bird, Bottle, Brew, Bucklee, Cupiss, Davenport, Hanbury, Herring, Hollier, Meggeson, Morson, and Squire, the following were elected

MEMBERS.

HALIFAX .....Gill, Hugh
KETTERING .....Watson, David
LONDON.....Yates, Francis

MAJOR EXAMINATION, *18th October.*

Allen, James Hore .....Barnstaple
Baker, Alfred Philip .....Cosham
Hinton, Henry Archibald .....London
Madgwick, William Butler.....Alresford
Mathew, John Alfred .....Cape Town
Thompson, Charles Henry .....Huddersfield
Videon, Charles .....London

MINOR EXAMINATION.

Delf, Frederick Daniel .. ..Southampton
Giddings, William H. C.....London
Holmes, William C.....London
Hooper, Frank .....London

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Allanson, George	Mr. Allanson	Harrogate
Beavan, Alfred James	Mr. Matthews	Mile End
Butler, Edwin	Mr. Dowman	Southampton
Dawson, Oliver Robert	Mr. Smith	Southampton
Ekin, Charles	Messrs. Argles, Son, & Stonham	Maidstone
Fearneley, J. William	Mr. Gamble	Grantham
Holmes, E. Morell	Mr. Hayward	47, Cheyne Walk, Chelsea
Laurens, F. Lemprière	Messrs. Ereaut	Jersey
Lescher, Frank H	Messrs. Evans, Lescher, & Evans	60, Bartholomew Close
Lock, Edward	Mr. Haydon	Fordingbridge
Martin, Frederick	Mr. Candler	Margate
Metcalfe, John Sykes	Mr. Mander	Preston
Ridding, William	Mr. Marris	37, Berners Street
Smyth, Samuel	Mr. Sims	8, Hemingford Pl., Barnsbury
Sutcliffe, J. Clarkson	Mr. Strachan	Barnsley
White, Alfred	Mr. Mount	Canterbury

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued*).

	£	s.	d.
Allan, William, Dumfries	0	10	0
Allen, Messrs., & Co., 38, Charterhouse Square	2	2	0
Atkins, Samuel R., Salisbury	1	0	0
Baildon, Henry C., Edinburgh	1	1	0
Baildon, William, Edinburgh	1	1	0
Baker, Messrs., Chelmsford	5	0	0
Baker, William, Retford	1	1	0
Barron, William, Cheltenham	1	1	0
Bedford, Joseph, 27, Haymarket	1	1	0
Blandford, John F., 9, Bruton Street	0	10	6

	£	s.	d.
Blanshard, George, Edinburgh	1	1	0
Blanshard, Thomas, Edinburgh	1	1	0
Branwell, George, Liverpool	1	1	0
Brewer, Eli, 43, Duke Street, Manchester Square	1	1	0
Brown, Jonathan, Manchester	0	10	6
Brown, James, 27, Aldgate	1	1	0
Brown, David R., Edinburgh	1	1	0
Burgoyne & Burbidge, 31, Throgmorton Street	10	10	0
Burns, James A., Stirling	0	10	0
Carrick, James, 46, Churton Street, Belgrave Road	1	1	0
Chipperfield, Robert, Southampton	2	2	0
Coles, John, New Road, Camberwell	1	1	0
Compton, Charles, 14, Brewer Street, Golden Square	0	10	6
Corfield, Daniel, 22, Thrawl Street	2	2	0
Cotton, Gilbert Knill, Barnstaple	1	1	0
Cotton, John Lovering, Barnstaple	1	1	0
Crispe, James, 4, Cheapside	2	2	0
Davies, Henry E., 43, Wood Street	0	10	6
Denson, J., Liverpool	1	1	0
Doughty, Edward William, 4, William St., Knightsbridge	2	2	0
Down, Richard H., Torpoint	0	10	0
Duncan, Flockhart, & Co., Edinburgh	5	5	0
Eddy, Charles W., 30, Crown Street, Finsbury	1	1	0
Fearnall, Messrs., & Co., Liverpool	0	10	6
Finlayson, Thomas, Leith	1	1	0
Foulkes, W. J., Birkenhead	1	1	0
Fowler, Richard, 14, Brewer Street, Golden Square	0	10	6
Fox, William, 48, Church Street, Bethnal Green	2	2	0
Fuller, J. G., Burntisland	0	10	0
Fuller, J. G., jun., Burntisland	0	2	6
Fusson, —, Fulham Road	0	10	6
Gale, Henry, 3, Millbrooke Place, Camden Town	2	2	0
Gardner & Ainslie, Messrs., Edinburgh	1	1	0
Gedge, W. S., 73, St. John Street	0	10	6
Gerard, Philip A., 390, Strand	5	5	0
Gill, Hugh, Halifax	1	1	0
Glanfield, George, Torquay	1	1	0
Glass, John T., Cheltenham	1	1	0
Goodbarne, Thomas, 13, Charles Place, Hoxton	1	1	0
Goodbarne, Thomas R., Hornsey Road	1	1	0
Goss, Samuel, Barnstaple	1	1	0
Gristock, Thomas, 42, South Street, Manchester Square	1	1	0
G. W. J.	0	2	6
H.	2	2	0
Ham, Charles, Collumpton	1	1	0
Hearon, McCulloch, & Squire, 95, Bishopsgate Street	10	10	0
Hill, William, Manchester	0	5	0
Hillgenberg, Henry, 11, Houndsditch	1	1	0
Hodgeton, David, Brechin	1	1	0
Hollier, Elliott, Dudley	5	5	0
Hooper, Bartlett, 19, King William Street, City	5	5	0
Hooper, William, 7, Pall Mall	5	5	0
Howden, Robert, 78, Gracechurch Street	1	1	0
Hughes, J. H., York Glass Company	1	1	0
Jolley, George, 13, Curzon Street, May Fair	1	1	0
Jones, Henry S., Fulham Road	1	1	0
Kemp, David, Portobello	1	1	0
Kershaw, George, Camden Town	1	1	0

	£	s.	d.
Lawrence, Frederick, Kentish Town	1	1	0
Lawrence, Henry, 49, High Street, Kensington	1	1	0
Lidwell, Joshua E., 86, High Street, Notting Hill	1	1	0
Lindsay, Robert, Edinburgh	1	1	0
Linsley, Thomas, York	1	0	0
Mackay, John, Edinburgh	5	5	0
Marshall, John F., Gainsborough	1	1	0
Martyn, —, Cliftonville, Brighton	1	1	0
McCulloch, Charles, Covent Garden	5	5	0
Negus, Samuel, Northampton	0	10	0
Oakley, George W., 35, Lamb Street, Spitalfields	1	1	0
Owles, Edward J., Southampton	0	10	6
Parsons, Edward, Barnstaple	1	1	0
Pasmore, James, Chelsea	1	1	0
Peacock, Hamerton R., Poplar	1	1	0
Pearson, Edward, Liverpool	1	1	0
Peppin, Sydenham H., 25, Princes Street, Leicester Square	1	1	0
Player, Edmund, Bristol	1	1	0
Pooley, John C., Bath	1	1	0
Potts, Robert U., 55, South Audley Street	1	1	0
Power, B. M., 19, Chesham Street	2	2	0
Powers, Edward, Atherstone	1	1	0
Procter, Richard E., Cheltenham	1	1	0
Prosser, Evan T., Woodstock	1	1	0
Radermacher, Charles J., 2, New Cavendish Street	1	1	0
Raimes, Richard, Edinburgh	5	5	0
Rankin, Messrs., & Co., Kilmarnock	3	3	0
Rawdin, Joseph, Jedburgh	1	1	0
Robertson, James, & Co., Edinburgh	2	2	0
Roach, Pope, 8, James Street	1	1	0
Sainsbury, Samuel, 177, Strand	1	1	0
Schacht, William, 38, Houndsditch	1	1	0
Shirley, John George, 1, Westbourne Grove, Bayswater	1	1	0
Sidley, Thomas J., Edinburgh	1	1	0
Sims, John F., 8, Hemingford Place, Barnsbury	1	1	0
Slipper, James, 86, Leather Lane	2	2	0
Smith, Nathaniel, Cheltenham	2	2	0
Southwood, Thomas S., Harrow Road	1	1	0
Starkie, James, 4, Strand	2	2	0
Steward, Messrs., Kidderminster	2	2	0
Stocken, James, 112, Drummond Street	1	1	0
Tatham, John W., Barnstaple	1	1	0
Thompson, Henry, 16, Wimpole Street	2	2	0
Thompson, Henry A., 86, Chiswell Street	5	5	0
Trotter, Messrs. G. & J., East Linton	0	10	0
Tupholme, John T., 38, Lamb's Conduit Street	1	1	0
Tylee, John P., Bath	1	1	0
Wagstaff, John Henry, James Street, Westbourne Terrace	1	1	0
Warburton, Thomas, Bolton	1	0	0
Warrior, William, Northallerton	1	1	0
Watts, William, 3, Gray's Place, Brompton	1	1	0
Welsh, Alexander, Dalkeith	1	1	0
White, Edmund, 19, Park Terrace	2	2	0
White, John, 228, Piccadilly	1	1	0
Wills, Thomas D., Barnstaple	1	1	0
Wilson, George, Professor, M.D., Edinburgh	1	1	0
Wyman, John, 122, Fore Street	5	5	0
Wyon, Leonard C., 54, Hamilton Terrace, St. John's Wood	1	1	0

	£	s.	d.
York Glass Company, York	10	10	0
Young, James R., Edinburgh	1	1	0

CORRECTIONS IN FORMER LIST.

For Mailor, J., Manchester, *read* Marlor, Jabez, Lees, near Oldham.
Omit Clark, W., Clifton, £1 1*s*.

PHARMACEUTICAL MEETING.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

Wednesday, October 5th, 1859.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

Illustrations of the Nueva Quinologia of Pavon. Parts I. and II. By J. E. Howard, F.L.S. From the Author.
Boudault on Pepsine. From Mr. Squire.
Proceedings of the Medico-Chirurgical Society. From the Society.
Transactions of the Linnean Society. From the Society.
Quarterly Journal of the Chemical Society, From the Society.
The Dentist. From the Publisher.
Assurance Magazine. From the Society of Actuaries.
Photographic Journal. From the Photographic Society.
Journal of the Society of Arts. From the Society.
Erinnerung an Mitglieder der Mathematisch-Physikalischen Classe der K. Bayr, Akademie der Wissenschaften. By Dr. C. F. P. Von Martius. Presented by the Author.
Robert Brown. By the same Author.
Specimens of African Turmeric. From Dr. Daniell.
Specimen of Dried Tamarind, and Syrup made from the same. From Mr. Haselden.

DISTRIBUTION OF PRIZES.

The prizes awarded to the successful candidates at the examinations which took place at the conclusion of the last session of the School of Pharmacy, were now distributed.

CHEMISTRY AND PHARMACY.

Dr. Redwood said he was enabled to give a favourable report of the Class of Chemistry and Pharmacy. The attendance had been good, and the conduct of the pupils unexceptionable. There had also been an unusually large number of competitors for the prize and honorary certificates, and it had afforded him much satisfaction to be able to recommend to the Council that five of these should receive marks of distinction.

The following were the questions for examination:—

1. What is the specific gravity of a liquid, one fluid ounce of which weighs 655.25 grains?
2. A piece of metal (*a*), weighed in air in the usual manner, weighs 255 grains; suspended from one end of a balance, and immersed in distilled water, it weighs 240 grains; immersed in like manner in a liquid (*x*), it weighs 237 grains. What are the specific gravities of the metal (*a*), and of the liquid (*x*)?
3. Represent the relative powers of conducting heat possessed by platinum, silver, iron, and copper.
4. Describe the general characters of the salts of barium, strontium, calcium, and magnesium, including their chemical reactions.
5. Describe the Pharmacopœia process for the preparation of *Liquor Potassæ*, and explain the conditions which are most favourable to the production of a pure solution of caustic potash, and the means of detecting impurities.

6. What is the best method of producing solid hydrate of potassa in a state of purity, and what are the impurities generally contained in it as met with in commerce ?
7. Give the formula representing the composition of nitrous ether. Describe the best method of producing this ether, the reactions which occur in its production, its properties, and the changes to which it is subject.
8. Describe the process of the London Pharmacopœia for the preparation of *Spiritus Ætheris Nitrici*, and state the proportion of nitrous ether usually contained in this preparation.

The prize and certificates were awarded as follows :—

John Henry Baldock.....Medal
George Brigg Pearson.....First Certificate of Merit
Edwin Barnes.....Second "
Thomas Fleetwood.....Third "
Albinus J. Roberts.....Fourth "

BOTANY AND MATERIA MEDICA.

Professor Bentley said that he was very glad to report most favourably of the conduct and diligence of the students in his class during the last session. The competition for the prizes was a very severe one, nine of the pupils having contended for them, of which five had been awarded honours, and he must add that they had well earned their distinctions. He thought that it was a very satisfactory circumstance to find that the pupil who had succeeded in obtaining the medal on the present occasion, had distinguished himself two years since by gaining the silver medal given by the Council for the best herbarium. It proved that the possession of the latter had acted as an additional stimulus on the present occasion, and showed how desirable it was for the student to ground himself practically in botany during his apprenticeship.

The questions for the written examination were :—

1. What are the substances contained in young Cells? Describe the structure and mode of development of the Starch-granule?
2. Define a Bulb, Corm, Rhizome, Tuber, and Tubercule. Mention the officinal substances which belong to them respectively, and name the plants which yield them, and the Natural Orders to which they belong.
3. What are the differences between Annual, Biennial, and Perennial Plants? Distinguish between Epiphytes and Parasites?
4. Define a Spike, Amentum, Spadix, Raceme, Corymb, Panicle, Capitulum, Umbel, and Cyme.
5. Enumerate the officinal plants of the *Compositæ*. Describe the physical and chemical characteristics of Dandelion root, and state how it can be distinguished from other roots; also, mention the time at which Dandelion is usually regarded to possess the greatest activity, and the data upon which such an opinion is founded.
6. What are the characters of Alexandrian, East Indian, and Tinnivelly kinds of Senna? Mention their botanical and geographical sources, the substances commonly used to adulterate them, and the means by which such adulterations can be ascertained.
7. Enumerate the officinal plants of the Order *Piperaceæ*. Describe the substances obtained from them respectively, the conditions in which they are collected, the countries which produce them, and their medical and economic properties.
8. Give the essential characters of the following Natural Orders:—*Cruciferæ*, *Rutaceæ*, *Cucurbitaceæ*, *Solanaceæ*, *Scrophulariaceæ*, *Polygonaceæ*, *Dioscoreaceæ*, and *Liliaceæ*.

VIVA VOCE EXAMINATION.

Besides the questions given above, to be answered in writing, the following plants were submitted to the candidates, who were required to name them, to state the natural order to which they respectively belonged, to mention their medical and economic properties, and to describe any peculiarity which they might present :—

Aconitum Napellus — Delphinium Staphysagria — Adonis autumnalis — Althæa officinalis — Astrantia major — Fœniculum vulgare — Apium graveolens — Daucus Carota — Fuchsia spec. — Lobelia inflata — Ecbalium officinarum — Rubia tinctorum — Knautia arvensis — Artemisia Absinthium — Tanacetum vulgare — Cynara Scolymus — Inula Helenium — Anchusa tinctoria — Symphytum officinale — Pentstemon spec. — Verbascum Thapsus — Jasminum spec. — Lysimachia Nummularia — Mentha Pulegium — Mentha Piperita — Mentha viridis — Marrubium vulgare — Origanum vulgare — Gentiana asclepiadea — Solanum Dulcamara — Solanum nigrum — Datura Stramonium — Nicotiana spec. — Rumex aquatica — Mercurialis annua — Aristolochia Clematitis — Veratrum nigrum — Funkia spec.

The medal and certificates were awarded as follows :—

Thomas Fleetwood .....Medal
George Brigg Pearson .....First Certificate of Merit
William H. C. Giddings.....Second "
Edwin Barnes .....Third "
Frank Hooper.. .....Fourth "

The following papers were read :—

ON AFRICAN TURMERIC.

BY WILLIAM F. DANIELL, M.D., F.L.S.,
Hon. Member of the Pharmaceutical Society of Great Britain.

Among other vegetable products resorted to by the native Africans for the purposes of dyeing, are certain tubers procured from a plant apparently indigenous to West Africa. Being frequently offered for sale in the markets of Sierra Leone, my attention was engaged in 1856 to discover their source and appliances. These rhizomes, in their fresh state, were of a greyish or pale orange color externally, smooth, somewhat plump and fleshy, variable in size, and marked by a series of transverse rings ; one extremity being partly round or blunt, the other flat, having a central eschar or notch, indicating its detachment from another of maturer growth. They were usually met with under the form of slightly-curved, more or less cylindrical masses, from one to five inches in length, and about half to one and a half inches in diameter. A number of minor lateral offshoots or tubercules proceeded from most of the larger varieties, which thus often assumed a palmate conformation. Occasionally intermixed were large round tuberous roots, distinguished by similar annular wrinkles, and evidently constituting the parent stock from which the preceding ramifications had sprung. When broken, the internal surface presented a deep golden or orange tint, with a smooth, wax-like fracture. With the exception of a brighter hue, their physical characters so closely resembled those of the East Indian Turmeric, that it would be difficult to define their distinction in the absence of other specific differences, since the African drug is equally endowed with the peculiar odour and taste of the former, tinges the saliva yellow, and freely imparts its coloring principles to both spirit and water.

Laboring under the impression that these rhizomes could only have been furnished by some species of *Curcuma*, I was induced to place several in my garden, with the view of ascertaining to what particular variety they pertained. In the course of a few months the young shoots appeared, flowered, and, much to my surprise, proved to belong to a beautiful *Canna*, commonly designated in colonial parlance by the name of *Indian shot*. Observing that similar plants were cultivated in the adjacent negro enclosures, I had a quantity of their roots dug up, which were found to correspond in every respect with those I planted. Specimens in leaf, flower, and fruit, were carefully preserved and transmitted to my friend Mr. Bennett, of the British Museum, and by him determined to be identical with the *Canna speciosa* of Roscoe. This species does not appear to have been mentioned by botanical writers as indigenous to Western Africa, and has probably been confounded with the *Canna Orientalis*, or *Indica*, which are stated to be more or less common in Sierra Leone and other regions of the coast to the

southward. Roscoe, in his work on Monandrian plants, has given a good figure and description of this production reared in the Botanic Gardens of Liverpool, from seeds brought from Africa in 1819.* Roots were subsequently received from Dr. Wallich, at Calcutta, who had discovered the same species growing in Nepaul.

During the early settlement of Sierra Leone, a great variety of useful seeds and roots were forwarded by Dr. Roxburgh from the East Indies, with the object of increasing the commercial resources of the infant colony. Suspecting this plant might thus have been introduced and subsequently naturalized by culture, I instituted a series of inquiries among the old African settlers, in the hope of obtaining some satisfactory information relative to its origin. Sufficient data, however, did not exist to determine this point. Several of the negro inhabitants nevertheless, asserted that it had been imported from the Slave coast, where the roots were extensively employed by the Foys and Mahes to dye grass and cotton fabrics a yellow hue. It is therefore no doubt the product to which Robertson alludes, when he observes that in Dahomey "these yellows are dyed with a root, which has the appearance of ginger. The color appears to resist acids better than some of those used in Britain."†

Thonning, in his *Bescrivelse af Guineiske Planter*, briefly describes a *Canna rubra* flourishing in Acquapim, and the *Curcuma longa* as cultivated by the natives in that portion of the Gold coast, but does not specify any distinct locality where the latter may be procured. Hitherto, no species of *Curcuma* has been described as indigenous to intertropical West Africa, and it seems doubtful whether it has even been introduced by European colonists, if so, the cultivated plant has since disappeared. Thonning, doubtless from a casual inspection of these tubers, may have been led to the erroneous conclusion that they pertained to the above *Curcuma*, which on inquiry would be apparently confirmed by their aboriginal appliances and other peculiarities indicating a remarkable affinity to turmeric.

Similar kind of rhizomes are produced, probably from this *Canna*, to a limited extent in the Portuguese Island of St. Thomas, a small sample of which I purchased in 1850, at St. Anna de Chaves, and deposited as specimens in some of the economic museums in this country.

African turmeric is cultivated by the inhabitants of Sierra Leone, chiefly for the rich yellow dye it yields. Grass cloths, mats, baskets, and other aboriginal manufactures are colored from a peculiar preparation of the roots, which, retaining their permanency of hue, become highly esteemed as articles of traffic. The brilliant flowering spike, large bright green leaves, and luxuriant development, render the plant one of the most conspicuous ornaments of the colonial gardens. Its inflorescence occurs in April, and, in fact, throughout the rainy months, the tubers attaining their maturity about December or January; they are then dug up and exposed to the sun, previous to their collection for the markets. The price hitherto has been merely nominal, being solely dependent on the demand. In some parts of India, this, and other species of *Cannæ*, have been considered sacred to Buddha, owing to an ancient tradition which ascribes their source to the sprinkling on the earth of a few drops of blood, from an accidental wound of his foot against a stone. Hence the seeds are occasionally used in the formation of rosaries, which constitute important adjuncts in certain religious rites and ceremonies.

The long palmate tubers become much shrivelled up by age, are marked with

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* His descriptive outline is as follows:—

Gen. Char. Anther single, attached to the margin of the petal-like filament; style erect, club haped; tigma an obtuse scale; capsule 3 celled; seeds numerous, globose.

Spec. Char. Spike erect; upper lips of corolla in two sections, ovate, deeply bifid, claws long narrow, lower lips narrow, linear, notched at the apex, declined towards the right; leaves broad lanceolate, strongly nerved.

† *Notes on Africa*, p. 265.

longitudinal wrinkles, and undergo such external alterations as lead to a considerable modification of form. Paper tinged with a decoction of the bruised roots furnishes characteristic changes, precisely in accordance with those obtained from turmeric, and, in a series of brief experiments made by my friend Dr. G. O. Rees and myself, they appeared to correspond in several respects with those stated by pharmaceutical authorities. The color, however, produced from alkalies is of a deeper tint, and as a test, indicates a superior sensitive action to their influences. The yellow coloring matter (Curcumin?), on which the dyeing properties depend, may probably be procured by a similar process by which it is extracted from the different *Curcumas*. A consideration of the preceding details would lead to the supposition that this product may comprehend one, among other varieties of turmeric imported into England from the East Indies, and the subject is therefore worthy of careful investigation.

Professor Bentley observed that it was a remarkable circumstance that the rhizomes now described should present such marked resemblances to ordinary commercial turmeric, as they were derived from a plant belonging to a different natural order to that from which turmeric was obtained. It was, however, an additional proof of the close affinity of the *Marantaceæ* and *Zingiberaceæ*, the two orders respectively from which African and ordinary commercial turmeric were derived. In answer to a question from Mr. Hanbury, Mr. Bentley said that he had reserved some of the rhizomes forwarded by Dr. Daniell for cultivation, and trusted that he might be able at a future meeting to exhibit the plants produced to the meeting.

Mr. Lescher thought that the African turmeric now exhibited was a different substance in a commercial point of view to that of ordinary turmeric.

Mr. Bentley believed that the difference thus noticed by Mr. Lescher was due to the circumstance that the African now exhibited was in a fresh state. He had seen it in a dried condition, and it then more closely resembled commercial turmeric.

ON SYRUP OF GINGER.

BY MR. BARNARD S. PROCTOR.

Some notes upon certain preparations of the Pharmacopœia, which I had addressed to the Pharmacopœia Committee, were published in the *Pharmaceutical Journal* for July, suggesting, among other things, a change in the formula for syrup of ginger. At that time pressure of other occupations prevented me from carrying out completely the experiments which occasional leisure has since then enabled me to make upon the preparation of syrup of ginger. The results of some of these I now proceed to communicate, together with the formulæ deduced from them:—

1. Pharmacopœia process:

Bruised ginger, 2½ ounces.
Boiling water, 1 pint.

Infused for twelve hours, and subjected to strong pressure, yielded ten ounces of turbid liquid, which was not improved by being strained through calico. It was then thrown upon a paper filter, through which it passed at first slowly, and then ceased altogether, the filtrate being nearly as turbid as before. The whole of the liquor, upon standing twenty-four hours, deposited a flocculent precipitate, and yielded about seven ounces and a half of clear infusion, which, upon conversion into syrup, let fall a second precipitate, the whole of the clear syrup obtained amounting to not more than nineteen ounces.

2. With the view of ascertaining how nearly the first infusion had extracted the pungent matter of the ginger, the residue of the first experiment was infused with forty ounces of boiling water for twelve hours, and pressed. This infusion still having considerable flavour of ginger, it was repeated twice more

in the same manner, making altogether 140 ounces of boiling water and forty-eight hours' maceration, and yet the ginger was not by any means exhausted. On being dried it weighed one ounce and a half. After being powdered, four ounces of rectified spirit were percolated through it, which extracted the whole of its remaining pungency, yielding a strong dark-coloured tincture. It was then re-dried, and found to have lost no appreciable weight.

The second infusion began to turn mouldy during the two days which it was kept, while the third and fourth infusions were being prepared.

The second, third, and fourth infusions were then mixed and boiled down to twenty-four ounces, when they had about the same degree of pungency as the first (P. L.) infusion, rather a darker colour, and filtered bright without difficulty.

From these experiments it appears that in the P. L. process we obtain only about $\frac{10}{34}$ of the pungent matter, which may be extracted with water, and that if the subsequent settling is had recourse to for obtaining a bright syrup, the amount is further reduced to between 6 and 7-34ths, and that the whole of the pungent matter is available for making syrup, by operating in the manner indicated in the second experiment. We also perceive that water extracts from the ginger substances which are prone to change, as evidenced in the second infusion becoming mouldy; and though this feature is lost sight of in the syrup, probably it may be called into play again upon the syrup being diluted in dispensing.

Thus the P. L. process is troublesome, and even when carefully conducted, extravagant and imperfect.

3. The process of P. D. (adding one ounce of a strong tincture of ginger to seven fluid ounces of syrup) yields a much more powerful syrup, but not a satisfactory one, as it is turbid, and some of the oleo-resinous matter of the ginger separates, floating on the top, and adhering to the sides of the bottle.

4. The U. S. formula (four ounces of a strong tincture of ginger rubbed with 10 pounds of sugar, evaporate the spirit with a gentle heat, add sixty-four ounces water, and dissolve) yields an opalescent syrup deficient in activity.

5. One part essence of ginger* mixed with eight parts of water, forms a turbid liquid, which does not settle upon standing several days, is not fined by filtration nor by the addition of sugar.

6. One part of essence of ginger with one of water settled for three days, gave a clear, pale yellow, pungent liquid, turning opalescent on being mixed with water.

7. Twenty parts essence of ginger, twenty parts water, one part saturated solution of alum, settled nearly bright in one day. One part of the settled liquor with seven parts of simple syrup was slightly opalescent, and more pungent than the syrup of ginger, P. L.

8. Two parts essence of ginger, twenty parts water, one part saturated solution of alum, a sufficient quantity of liquor of potassa to precipitate nearly all the alumina, the whole briskly shaken together, thrown upon paper, filtered readily, the filtrate being clear, nearly colourless, and pungent.

The results of the last three experiments indicate available processes; from them I deduce the following formulæ, either of which gives a satisfactory result.

FORMULA, No. 1.

Take of Essence of ginger	f℥vi.
Distilled water	f℥vi.
Alum	grij.
Liquor of potassa	♏ x.
Sugar	℥xii.

Dissolve the alum in the water, add the essence, then the liquor of potassa, shake briskly, filter through paper, add the sugar, and dissolve with a gentle heat.

The syrup thus prepared is clear and colourless, rather more pungent than

* ℞ P. Zingib. ℥vj.—S. V. R. Oj.; percolate.

the syrup of the present Pharmacopœia, but so nearly the same that it may be substituted without altering the uses or doses. About the same quantity of spirit is used in its preparation, and about one-ninth of the quantity of ginger. In addition to these legitimate ingredients, it contains about one-tenth of a grain of sulphate of potassa to each ounce of syrup, a quantity too small to be of any importance, but if it be thought desirable to avoid even this, the following formula may be substituted:—

FORMULA, No. 2.

Take of Essence of ginger..... ℥vi.
Distilled water..... ℥vi.
Sugar..... ℥xii.

Mix the essence with its own bulk of water and let it stand for two or three days, decant or filter off the clear liquor, add the remainder of the water and the sugar, and dissolve with gentle heat. Thus prepared it has a yellow tinge, and is not quite bright.

The results with syrup of tolu are almost identical, but the medicinal effect of tolu (if it has any) may be expected to be possessed in a smaller degree by a syrup prepared by this process than that made by the old one.

11, *Grey Street, Newcastle-on-Tyne.*

MR. WHIPPLE thought the author had laid too much stress on the importance of having the syrup bright, and had not apparently attended sufficiently to its qualities in other respects. Error was often committed in endeavouring to make medicines clear, and their efficacy was sometimes destroyed in doing so. Ginger contained not only resinous matter but also essential oil, and when the process of the Pharmacopœia was followed for making syrup of ginger the product was fully saturated with the oil. He was a great advocate for strict adherence to the Pharmacopœia.

ARSENICAL FLY-PAPERS.

BY HARRY N. DRAPER, F.C.S.

WHILE criminal poisoning with arsenic is a matter of so frequent occurrence, all facts which tend to lessen the difficulty of convicting the prisoner are of the highest importance. A medical jurist appointed to investigate such a case would, in all probability, little think of seeking the source of the poison in a fly-paper.

Fly-papers are sold by the thousand; there is scarcely a house without them; they are positively stated to be perfectly harmless to animal life of a higher order than that of our insect pests. That such is, however, far from being the case, the following results of an examination of them will show. The papers selected for examination as being those most generally employed, were those known as "Papier Moure."

Four of the sheets were taken at random and digested with dilute hydrochloric acid until a pulpy mass was obtained. This pulp was then placed on a filter and washed with distilled water until the filtered fluid amounted to about four pints. This was next evaporated until only eight ounces remained, and sulphide of hydrogen was passed into it for two hours. During this time a copious precipitate of sulphide of arsenic was thrown down, and the beaker containing the fluid was therefore set aside in a warm place to ensure its complete separation. The precipitate was collected on a filter, washed, and dissolved in dilute solution of ammonia, from which it was re-precipitated by hydrochloric acid. The pure sulphide of arsenic was finally collected upon a tared filter, dried, and weighed. Its weight was found to be 12.675 grains, equivalent to 10.201 grains of arsenious acid. The average quantity of arsenious acid contained in each of the sheets was therefore 2.55 grains, quite enough to destroy a human life.

Is it not rather an evidence of faulty legislature, that while restrictions are placed upon the sale of arsenic *as* arsenic, the poison should be so readily obtainable in the form of "Papier Moure."

It may not be uninteresting to mention that the presence of arsenic in a fly-paper may be very readily detected by moistening a strip of the paper with a solution of an alkaline acetate, drying by the fire and igniting. As the paper smoulders away the unmistakable odour of *alkarsin* affords ample evidence of the poison.

In the filtrate from the sulphide of arsenic I found iron and lime, derived, of course, from the tissue of the paper itself, and on evaporation, a dark-coloured extractive matter, which, owing to its taste being much modified by the chloride of ammonium formed in the course of the analysis, I was unable to identify. There was also a considerable quantity of potash, which had doubtless served the purpose of dissolving the arsenious acid.

Dublin, September 21*st*, 1859.

Mr. Cupiss, of Diss, thought the study of the means of detecting poisons very important to the Pharmaceutical Chemist. Not only in such cases as the one referred to in the paper just read, but in others of a more abstruse nature, the Chemist, if he received a suitable education, might confer benefit upon the public by aiding in the detection of poisons. He should like to see this branch of study made a more leading feature in the course of instruction given in the Society's Laboratory.

Dr. Redwood said the detection of poisons had always formed part of the course of instruction given in the Society's Laboratory, but the time the pupils could devote to that particular study was generally limited. The object they had in view in the instruction provided by the Society was to produce good Pharmaceutical Chemists, and the studies required for this purpose embraced subjects of far greater importance to them as Pharmaceutists than the investigation of toxicological questions, which belonged more properly to medical men, who made it their special study.

A FEW REMARKS ON PHARMACEUTICAL INFUSIONS, AND A PROPOSED MODE OF PREPARING THEM MORE EXPEDITIOUSLY.

BY MR. GELDARD.

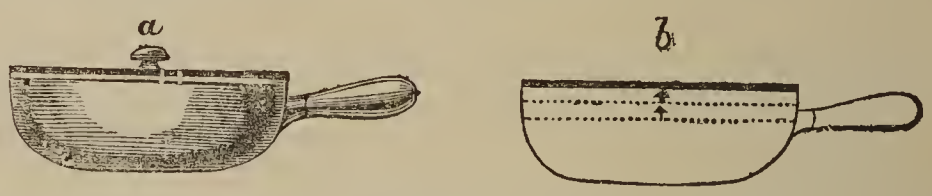
In reflecting on the preparation of the Infusions of the Pharmacopœia I was forcibly struck with the fact that, although so much has been felt and said about the time to wait while an infusion is making, and concentrated infusions have been so generally used (the best of which, even when freshly prepared, are inferior to their models), nothing has yet been done to expedite the process, for the vessel stands the same both by order and practice, simply a *covered vessel.* Also, it is well known that in the hurry of business, it not unfrequently happens that the infusion after being once set going gets little attention in the way of stirring.

The framers of the Pharmacopœia of '51 seem then to have felt the matter of time, and ordered the two infusions, whose properties would not suffer by concentrating, to be so dealt with—that of cinchona and cinchona pallida; but the rest could not be touched.

To meet this matter of time I was led to consider that if full advantage were taken of the displacement which takes place in heating and cooling water, in addition to the ordinary one of placing the ingredients just under the surface of the liquid, the usual period of maceration might be reduced to a mere fraction, and in practice this has been proved to be so.

I have a vessel of pure metal (tin hardened with antimony or silver) made of

the shape of an ordinary bleeding basin, and of content, say half a pint; a strainer of the same metal is placed at a fitted distance for the reception of the ingredients, and another keeps them down, on which half a pint of water is poured, and a lid of the same metal accurately covers the pot, which is placed on one of Maw's portable gas-furnaces, and with a suitable flame it boils in about three or four minutes; it is *immediately* removed into the felt jacket for six or eight minutes, which being taken off, the pot is to be put into a convenient tray and cold water poured over the lid until it rises in the tray to the height of the side of the pot, taking care that it does not enter it; in five or six minutes it will have cooled sufficiently to strain off. If the ingredients be bulky they may be pressed by means of the upper strainer, pressing it with the finger and thumb. It will at once be seen that the water is kept in continued motion from beginning to end; as soon as heat is applied each particle of water goes to the bottom of the vessel, is heated, and rises to the top, which is replaced by a fresh portion, carrying with it the soluble matter of the ingredients; again, on removal from the fire and being covered with a non-conductor, the radiation of heat and consequent cooling goes on from the broad polished surface of the lid by which an opposite motion is effected.



a. Infusion pot and cover complete; *b*. Section of pot, showing the position of the strainers and their knob handles.

Lastly, a disturbance on all sides must be brought about in the process of cooling, and the result shows that the materials have been thoroughly washed, and are as much exhausted as if treated for a much longer period in the usual way; and not only so—the infusions are uniform.

Thus, I believe, I have furnished a mode which must be of utility to every dispenser, and it will be his interest to use it, while at the same time the formulæ of the Pharmacopœia are not interfered with more than heating the water in the same vessel.

In this way a dispenser having a prescription brought him, say with cascarilla or cusparia, will have the satisfaction of being able to say "it will be ready in twenty minutes," instead of hours, and knows that he is giving the patient an aromatic medicine, instead of a vapid and mawkish liquid made from a bottle which may have been on the shelf half or third full for months depositing its activity.

George Street, Plymouth, October 1st, 1859.

MANUFACTURE OF OTTO OF ROSES.

The Chairman read the following extracts from a paper he had received, originating from a respectable mercantile house at Constantinople, and relating to the manufacture of Otto of Roses:—

The distilling of otto of roses being completed, including those places lying in the centre of the Balkan mountains, we beg to submit the result in the following report:—

In order the better to arrive at the quantity of otto produced, we herewith give a list of all the places from which it is procured; the number of stills noted below we have with much trouble ascertained personally, and we can say with certainty that on the whole not more than 2 per cent. of the manufacturers have been left out.

District of Kezanlyk.

		Stills.
*†‡	Kezanlyk	62
†‡	Haemitli	54
†‡	Bäschirli	21
‡	Ascharrasaranli	1
‡	Jokarrisaranli	7
*†	Soflar Jokarki	32
†‡	Juranli	8
†	Akhbasch	22
‡	Keterrilass	4
*†	Böjük Oba	82
†‡	Kütschük Oba	42
‡	Doïmüschlär	50
†	Oktschülär	107
*†	Melemess	90
‡	Ilitschali	23
‡	Kara Jeïkli	15
*†	Meschid Sünedlër	12
*†	Tschami Sünedlër	29
*†	Kössöl-atsch	24
‡	Müghlüss	30
‡	Landra-köi	8
‡	Aschaki Soflër	4
‡	Jeïkanli	27
‡	Kischlar	12
†‡	Oklanli	31
‡	Jeni Mahalö	2
‡	Jassë Wirann	42
‡	Kassludscha	40
‡	Tschannakdschi	9
‡	Hamursus	19
†	Acschüklar	22
†	Oruslër	12
*†	Armachan-köi	28
†‡	Karchanli	10
‡	Emischlër	14
‡	Hirsova	92
*†	Kowanlik	26
†‡	Ketschi-tërrë	31
‡	Hass-köi	5
†‡	Jumurtschuli	19
*†	Schibbkarr	103

41 villages with 1271 stills

District of Jeni Sagra.

‡	Aeschikdschë	6
†‡	Haïn-köi	14
‡	Jun-köi	21
‡	Kiérdidsch	2
‡	Ferdidsch	11
†	Tersi Oba	3
‡	Tschumahali	1
‡	Ekistsche	1
†	Azatli	3
†	Adlar	1
‡	Tschanakdscha	14

11 villages with 77 stills

District of Philoppopel.

		Stills.
*†	Carlova	12
*†	Karatscha-at	13
†	Isak Faki	1
†‡	Müslitschali	5
†‡	Söitschik	9
†‡	Sarö Tesmitschilë	4
†	Kotschi Oglulër	2
‡	Aschagki Baltschilër	3
†‡	Muslin Baltschilër	8
‡	Maghmudlar	10
†‡	Tschaylër	21
†‡	Kuri Aghadschilër	5
‡	Kalaïdschilër	3
‡	Ellëlër	1
*†	Rachmanlö	39
*†	Hadschar	66
†‡	Berrada-köi	19
*	Tokanndscha	2
‡	Kurfanli	2
†‡	Tschatall-tëpë	12
*†	Ilidscha	4
†‡	Mukerli	10
*†	Tschukurli	20
†‡	Haemitli Käpir	7
‡	Deïrmen Maghalëssi	2
†‡	Tukudscha Fabrikan	5
*†	Sëntschirli	13
†‡	Aïranli	5
†‡	Jeni-köi	7
‡	Tschanakdschilër	2
†	Kuri Haemitli	1
†‡	Kutschimarlar	18
‡	Dari Obassi	4
†‡	Bokas-köi	9
*†	Aschagki Omar Obassi	33
†‡	Kebir Omar Obassi	18
†‡	Kawassdschik	14
†‡	Përasik	24
‡	Odlu-köi	1
‡	Peruschtihsa	1
*†	Kalefër	27
‡	Kürd Bey-köi	5
†‡	Müderis	43
*†	Arablë	8
*	Akdschä Kilissae	2
*	Aburlar	2
†	Ewdschilër	1
†‡	Tartarli	3
†	Jan Obassi	8
†‡	Aeschiklër	3
†‡	Kerranlër	7
*†	Tëkë	17
* ‡	Abdul Rachmanly	41
†‡	Perassaden Derwendi	30
*†	Jan Béyliki	25
*†	Kara Sarli	14

Carried over 671 stills

* Signifies first quality. † Signifies second quality. ‡ Signifies weakest quality.

		Stills.
	Brought forward	671
*†	Terëli	41
*†	Kösserlër	46
*†	Köllerlër	18
*†	Okdschilër	10
†‡	Salih-köi	18
	61 villages with	804 stills

District of Eski Sagra.

†‡	Eski Sagra	9
†‡	Kerista	6
‡	Kölla	4
‡	Azërli	4
‡	Buklumik	2
‡	Idir Bey	7
‡	Kirk Owa	9
‡	Ismawli	2
†‡	Jeni Mahalö	9
†‡	Derbend	9
‡	Anserlër	9
‡	Baraklër	1
†‡	Ada-tëpë	15
†	Kassanka	31
‡	Sonkurlër	1
†‡	Palikli	10
‡	Pantikli	2
‡	Aeschek Sinekli	4
	Carry up	134 stills

		Stills.
	Brought up	134
‡	Tëkë	3
‡	Kara Werlër	5
	20 villages with	142 stills

District of Tschirpan.

†‡	Tschatall-tepe	8
†	Kornukdschi	19
†‡	Ewitschilër	10
‡	Kalfa	2
‡	Jeni Mahalö	5
*†‡	Jeni Schar Jokarki Mahalö	91
‡	Jeni Schar Aschachki Mahalö	13
‡	Karatschi Wiran	10
†‡	Aschiolër	15
†‡	Ala Kün	31
‡	Schäkerr Buna	3
	11 villages with	207 stills

Total:

Kezanlyk ...	41	villages	with	1271	stills
Philoppopel ..	61	"	"	804	"
Tschirpan ...	11	"	"	207	"
Eski Sagra...	20	"	"	142	"
Jeni Sagra...	11	"	"	77	"
	144	villages	with	2501	stills

In the past year there were about 3000 stills at work in the places named. The considerable decrease in this year applies only to the districts of Philoppopel and Kezanlyk; those places, in the former district especially, lying adjacent to and in the mountains, have had hard frosts, which in some villages destroyed the whole of the crops, and in the others reduced the yield compared to that of the previous year by one-fourth to one-third; during last spring there were a great many floods in those places belonging to the district of Kezanlyk, those villages lying near the mountains suffering the most. For instance—

Kowanlyk,	worked	last	year	with	95	stills, and now with only	26
Carlova,	"	"	25	"	"	"	12
Iladscha,	"	"	30	"	"	"	4
Jan Obassi,	"	"	25	"	"	"	8
Tartarli,	"	"	8	"	"	"	3

and many other places in like manner; in the district of Kezanlyk there are four villages which this year have not made a single metical, whilst in the previous one they delivered a pretty considerable quantity.

In the district of Jeni Sagra the rose plant has been subject to a blight, similar to that of the vine so often mentioned of late years; the same, however, has for the present only shown itself to any extent in the village of Ekistsche, where it has destroyed seven-eighths of the crop, but it is feared that it will spread in the ensuing years.

But, nevertheless, that which has been spoilt by the unfavourable circumstances above named, has been amply made up by the cold and wet weather during the distilling period; only in the last fourteen days have we had great heat with little rain.

It is calculated that on the average twelve occas of leaves yield one metical; some days in the previous year seventeen occas would only furnish one metical, but this year the average can be taken at ten to eleven occas, and cases are

known to us where, on a very cold day, eight to nine occas, and even seven occas of leaves, yielded one metical.

The period for distilling lasts in each place usually 14 days, and it is reckoned that in this time one still produces about 120 meticals, but we know that in this year in many villages it may be computed at least 170 meticals; it is true that this is only the case in the villages lying in the lowlands, whilst in the mountains the result is beyond all expectation bad; the night-frosts and floods have destroyed more than the half of the rose plants, and during the distillation the want of leaves was much felt, so that, for instance at Hadschar, only about 6000 meticals were procured from 66 stills, and the like was the case in the other villages similarly situated. These places were also unfortunate in the weather during the time of distilling; the harvest is always four to six weeks later in the mountains than the lowlands, and Hadschar and Rachmanlo, for instance, have only completed their distillation two days ago. The weather was, however, the last fortnight fine and dry.

If we take all the places together, we think we are right in computing the average of this year's yield at 135 meticals oil to every still; the total amount therefore of otto of roses produced this year would be about 338,000 meticals, whereas in the previous year it was only about 300,000 meticals. If we, however, compare this with the last year as regards the qualities, a quite different result will be manifest. It is no doubt known that the mountainous districts yield a very strong and quickly congealing oil, whilst the villages the lower they are situate produce an oil so much the weaker, and only with very cold water either to be slowly congealed, or not at all. Last year those places situated in the mountains delivered about 70,000 meticals 1st strong otto of roses, and about 50,000 meticals of 2nd quality; the lowlands gave about 60,000 meticals 2nd, and about 120,000 meticals 3rd quality; this year, on the contrary, one can only reckon to receive from the mountainous districts about 30,000 meticals 1st, and 40,000 2nd; and from the lowlands, on the other hand, about 105,000 meticals 2nd, and about 163,000 meticals 3rd quality.

The decrease this year in 1st strong quality will hardly be noticed in Europe, as this description, with few exceptions, is not yet known there; the dealers here prefer buying the strongest quality, as it can bear a strong mixture of 3rd quality, and even of geranium oil, and yet congeal pretty well. That which is known in Europe as 1st quality passes here for 2nd.

They mostly sprinkle the leaves before distilling with geranium oil; these sorts of spurious oils we found at Kezanlyk, Kössöl-atsch, Müghlüss, Akhbasch, Schibbkarr, &c.; at Carlova, Rachmanlö, Böjük Oba, the manufacturers offered us oils, which, on examination, we found to contain not only geranium oil, but also cetaceum.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Annual Meeting was held at the Royal Institution, on Thursday evening, the 29th September, 1859, Mr. Abraham in the chair.

In opening the business of the Meeting, the Chairman briefly alluded to the constitution of the Association, and the object which had brought them together on that occasion; and then called upon the Honorary Secretary, Mr. Shaw, to read the

REPORT.

In taking a retrospective view of the proceedings of the Chemists' Association during the past, or tenth year of its existence, your Council have again the satisfaction of reporting its general prosperity.

From the period when the Society was formed, the increase in its Members and financial position has been constant and steady; and although this increase has not been so great during the last as in some preceding years, arising perhaps from

causes which have affected, more or less, the prosperity of the general trade of the country, yet your Council have pleasure in announcing that the number on the roll is in excess of that of last year, there being at present 153 Members and 14 Associates, of whom 16 Members and 3 Associates have been elected since last report.

The usual number of Meetings has been held during the past Session, and the attendance has been quite equal to that of any former one, and your Council look forward with confidence that in future years the value and importance of the General Meetings will be more fully recognized as a means of obtaining and diffusing valuable information.

In some former years there has existed a little difficulty occasionally in providing matter for the General Meetings, perhaps in consequence of solicitations not having been made sufficiently early in the Session; but during the past year, your Council have observed, with pleasure, the readiness with which a number of the Members, both ordinary and honorary, and also gentlemen not connected with the Society, have kindly come forward and contributed to the interests and advancement of the Association, by reading papers and delivering lectures on various branches of science connected with your profession.

In addition to the ordinary Meetings of the Society, a Conversazione of the Members and their friends, to which ladies were invited, has been held with marked success—encouraging the Council to provide future Meetings of a similar social character, for which purpose they have incurred some additional expense for gas fittings in the Royal Institution.

Your Council have much pleasure in noting the increased use which has been made of the Library during the past Session, and beg to observe, that to this particular branch of the Society's operations they attach the utmost value, feeling convinced that in the great object which they have in view, and that for which the Association was formed, viz. the improvement of the Science of Pharmacy, a good Library of standard works, by the best authors, is of paramount importance, and your Council will feel justified in appropriating as much of the funds of the Society as possibly can be spared for that especial purpose, and they are happy to state that it is now in a better condition than at any earlier period. During the past year twenty-one vols. have been added, five by purchase, and sixteen by presentation, making a total of 345 vols. at present belonging to the Association. The number of Members using the Library has been seventy-two, and they have taken out 738 vols., being a large increase over the circulation of any previous year.

The operations of the Laboratory have been conducted during the Session with an average attendance of Students, and very satisfactory answers were received to the questions for the President's Annual Prize, Mr. Dyce Duckworth being the successful competitor. It is only necessary to observe that it is desirable that Students should enter at the commencement of the Session, in order to sustain and encourage a fair competition.

The Museum also is in a progressive state, forty-eight specimens having been presented at the ordinary Meetings during the Session. A list of desiderata in the Museum has been made out, and may be seen at the Royal Institution, or on application to the Honorary Secretary ; and your Council beg to solicit your active interest in this department, a good collection of specimens of genuine drugs and chemicals being of obvious utility to all the Members.

During the past Session your Council have again had their attention directed to proceedings in Parliament in regard to the sale of poisons. A Bill was introduced into the House of Commons in February last by the Home Secretary, which contained several very objectionable clauses, and your Council took prompt action in the matter, representing to Mr. Walpole their views in reference to those clauses, and the Bill, after some amendments or alterations had been made, was eventually laid aside, and not further proceeded with; and your Council express a hope that any further legislation in regard to the sale of poisons will be discountenanced by all future Governments, believing that parliamentary enactments cannot remove the evils complained of, but that the only remedy is in the improvement of the education of the dealers in poisons, and their moral and pecuniary responsibilities in the form of criminal proceedings on the one hand, and the loss of business on the other, and that these form as great a protection to the public as any that can be devised consistent with the necessities of daily life.

You will observe in the Treasurer's Report which is submitted to you, that the

finances of the Society are in a satisfactory state; but your Council beg to suggest that the early payment of the subscriptions, without solicitation, would be of great convenience, and much lessen the labours of the honorary officers.

Your Council cannot conclude this Report without alluding to the great loss which has been sustained by the Society in the death of Jacob Bell, Esq., of London. A resolution of condolence and sympathy with his relatives was passed by your Council on the 22nd June last.

You are already aware that efforts are being made throughout Great Britain in order to raise a capital fund, out of which two scholarships may be formed, to be called the "Jacob Bell Memorial Scholarships," and your Council hope that this may be speedily accomplished, the object being worthy of the effort, and the honour to be done to the memory of the individual highly appropriate.

The CHAIRMAN, in moving the adoption of the Report, expressed the great satisfaction and pleasure which it afforded him in witnessing the continued prosperity of the Association. He reminded the meeting that the Members were now the most numerous, and the Society the most influential, of any of the provincial ones connected with their profession.

The motion was seconded by Mr. WRIGHT, and carried unanimously.

The Treasurer, Mr. SUMNER, read the Financial Statement, the receipts for the past year being £118 12*s.* 8*d.*, and the expenditure £83 5*s.* 11*d.*, leaving a balance of £35 6*s.* 9*d.* to the credit of the Association.

He also reported that nearly £60 had been subscribed towards the "Bell Memorial," and anticipated that the amount would be considerably increased.

The Liverpool Chemists' Association in Account with R. Sumner, Treasurer.

Dr. SESSION 1858-59. Cr.

	£	s.	d.		£	s.	d.
To Books	4	4	0	By Cash in hand	18	13	6
" Printing	9	16	9	" Subscriptions from 135 Members	67	10	0
" Stationery, &c.	2	14	5	" " " 14 Associates	3	10	0
" Subscription to Cavendish Society	1	1	0	" Laboratory Students	26	5	0
" One Member overpaid	0	10	0	" Library Fines	2	14	2
" Coffee and Attendance	14	6	9				
" Delivering Circulars, &c.	11	0	0				
" Sundry Expenses of Soirée	2	18	0				
" Rent	10	10	0				
" Cash—Dr. Edwards, Laboratory Fees	26	5	0				
" Cash in hand	35	6	9				
	£118	12	8		£118	12	8

By Cash in hand £35 6 9

Examined and found correct, DECIMUS WHARRIE, THOMAS R. ARNOTT, } *Auditors.*

September 29th, 1859.

Moved by Mr. MERCER, and seconded by Dr. EDWARDS, and carried unanimously, that the Financial Report be adopted.

The Secretary in Account with the Special Fund for defraying the expenses incurred in opposing the Sale of Poisons Bill, 1859.

Dr.	To Balance from last year			£1	18 0
Cr.	By cost of engrossing Petition to House of Commons, and Memorial to the Home Secretary, in February last	£0	10 0		
	By Postages	0	1 0		
				0	11 0
	Balance in hand			£1	7 0

The meeting then proceeded to fill up the vacancies in the Council caused by the retirement by rotation of Messrs. Abraham, Redford, Sumner, and Shaw; a ballot having been taken, these gentlemen were re-elected by a majority of votes.

Moved by Mr. MERCER, and seconded by Mr. SHAW—

"That the thanks of the Association be presented to those gentlemen who have delivered lectures or read papers at the general meetings, and also to the donors to the Library and Museum."

The motion was carried with acclamation.

Dr. EDWARDS moved a vote of thanks to the President, Treasurer, Secretary, and Librarian, for their services during the past year. He considered that they, were much indebted to these gentlemen, not only for the time which they had devoted to the business of the Association, but also for the zeal which they had evinced in promoting its prosperity. He was convinced that the several offices were now filled greatly to the advantage of the Society.

The motion was seconded by Mr. HOLT, and carried unanimously.

Mr. SHAW, for himself and the gentlemen named, thanked Dr. Edwards and the meeting for the complimentary expressions contained in the motion.

A short discussion took place with reference to the election of Honorary Members, Dr. Edwards advocating some change in the law providing for such elections. The question, however, of any such alteration could not be then entertained, in consequence of no notice having been given. Dr. EDWARDS therefore moved the following resolution:—"That the Council be requested to consider the subject of the election of the Honorary Members, with a view to the extension of the usefulness of such elections." This, being seconded by Mr. MERCER, was carried unanimously.

Mr. HOLT introduced to the notice of the meeting an indigenous plant, the *Erodium cicutarium*, growing in great abundance at Wallasey, and on the various sand-hills on the shores of the Mersey, it having been found to contain extraordinary diuretic properties. A specimen of the plant, and an extract prepared from it, was laid on the table. Mr. Holt stated that it had been prescribed by a medical practitioner at Seacombe with the most beneficial effect, and had proved quite efficacious where several other diuretics had entirely failed.

Professor BYERLEY, of Seacombe, had also administered it in a case of ascites with hepatic disease with the best results, the elimination of urine being very much increased, and the effused fluid considerably diminished.

Other medical practitioners who have tried it verify the above representations. It is administered in the form of infusion, according to the following formula:—One ounce of the dried plant (root and all) is infused in three pints of boiling water, and the infusion allowed to remain in an oven until it is evaporated to two pints. The dose for an adult is four or five fluid ounces three times a day.

A vote of thanks having been passed to the Chairman, the meeting separated.

Royal Institution.

The First Meeting of the Eleventh Session was held October 13th, 1859;

THE PRESIDENT IN THE CHAIR.

The following gentlemen compose the Council for the year 1859-60:—J. B. Edwards, Ph.D., President; Mr. J. Dutton, Vice-President; Mr. R. Sumner, Treasurer; Mr. J. Shaw, Secretary; Messrs. H. S. Evans, J. Abraham, C. Jones, H. Coupland, N. Mercer, A. Redford, T. D. Walker, W. Wright; Teacher of Practical Pharmacy, J. B. Edwards, Ph.D.; Librarian, Mr. T. D. Walker; Museum Committee, Messrs. H. S. Evans, J. Dutton, J. Abraham, J. B. Edwards, N. Mercer.

Messrs. J. Robinson, S. Hope, G. Woods, G. Dyke, and G. J. White, were elected Members. Messrs. G. Brown and J. McCormick were elected Associates.

The SECRETARY announced the following donations to the Library:—*Transactions of the Literary and Philosophical Society*, from the Society; *Statistics of Poisoning in Liverpool in* 1858, from the Author, Dr. Edwards; *On the Correlation and Conservation of Physical Force, and its Association with Matter*, from the Author, Dr. Edwards; *On the Marine Animals of the Mersey Shore*, from the Author, Dr. Edwards; *On the Physiological Properties of Xyloids*, from the Author, Dr. Edwards; *The Chemist and Druggist*, from the Proprietor.

The PRESIDENT introduced to the notice of the Members a number of photographs, by Maule and Polyblank, of London, called the "Literary and Scientific Club," and including most of the men whose names are intimately connected with the literary and scientific world. The portraits were well executed uncoloured prints from negatives.

The PRESIDENT then delivered the opening address, in which, after commenting upon the success of the Association since its establishment ten years ago, he referred to the death of the late Jacob Bell, whom he warmly eulogized as a zealous and earnest labourer for the good of others. He urged young men to studious habits, and quoted the general progress of education under the stimulus of the middle class

examinations as an incentive to increased exertions and more general progress, and recommended to all the cultivation of a hobby within reasonable limits, being assured that the zeal called forth in the pursuit of an acceptable and rational amusement contributed to mental vigour, and proved the best antidote to idleness or enervating pleasures. He rejoiced to find the Library in active circulation, and announced considerable additions thereto, including a microscope for the use of Members.

PROCEEDINGS OF THE NEWCASTLE AND GATESHEAD PHARMACEUTICAL ASSOCIATION.

A Conversazione was held at the rooms of the Association, on the evening of Thursday, the 22nd September, at which most of the leading Pharmaceutists of the two towns, and a large number of the young men engaged in their establishments, together with a few strangers who had been specially invited, were present.

Mr. T. J. Howson was called to the chair, on assuming which he congratulated the Members on the success that had so far attended their efforts, of which no more striking proof was needed than the appearance of the rooms on that occasion. He complimented the younger members on the spirit in which they had entered into the arrangements of the Association, and encouraged them to increased energy and activity.

In conclusion, the Chairman remarked that some present might not be aware that meetings for the discussion of scientific subjects had been held on the Thursday evenings since the close of the summer course of lectures, and as the Committee had decided that that evening ought not to form an exception, he therefore called upon Mr. H. B. Brady to read the paper he had prepared for that evening's meeting.

Mr. Brady then read a paper on Starch, making especial comment on the microscopical characters of the various commercial varieties, and illustrated the subject by a series of diagrams and a number of microscopical preparations.

After some discussion, the company proceeded to examine the various objects of interest on the tables, consisting of microscopes and other scientific apparatus, drawings, engravings, &c. &c.

The Chairman then called upon the Secretary, who announced the lectures for the coming session from the circular, of which we annex a copy.

The Lecturer on Pharmacy announced that the result of his examination had been satisfactory, and that Messrs. Temperly, Barclay, and Elliott, deserved especial mention for the attention and proficiency they had exhibited. The Lecturer on Botany, in making the same announcement, named Messrs. Barclay, Temperly, and Huntley, as having taken the highest numbers.

After votes of thanks had been passed to the Lecturers on Pharmacy and Botany, for their labours during the past summer; to the Committee for their care over the arrangements; and to the Chairman; the company separated.

Refreshments had been provided on a liberal scale, and the care of the Committee in this respect seemed to be fully appreciated.

"Pharmaceutical Society of Great Britain. Newcastle and Gateshead Branch Association. A course of twenty lectures on the Principles of Chemistry, organic and inorganic, will be delivered by Dr. A. Adriani, in the rooms of the Association, St. Martin's Court, Newgate Street, Newcastle, commencing on Thursday, the 6th October. To be continued on each successive Thursday during the months of October, November, and December, 1859, and January and February, 1860. A course of thirteen lectures on Inorganic Materia Medica will be delivered by Mr. William Proctor, commencing on Monday, the 3rd October. To be continued on each successive Monday during the months of October, November, and December. The lectures will contain a general description of those substances used in medicine which are derived from the mineral kingdom, and remarks on the more important of their preparations. The lectures will commence each evening at half-past eight o'clock punctually."

ORIGINAL AND EXTRACTED ARTICLES.

SYRUPUS FERRI IODIDI.

BY MR. EDWARD SMITH.

The object of the present communication is not to consider the different methods of preparing syrupus ferri iodidi, but to point out the variable proportions of iodide of iron contained in the syrup obtained from several sources, arising, probably, in some instances, from the process followed, but in others, it is to be feared, from premeditated design.

After numerous experiments, the process found by the author most successful for the preparation of the syrup, consists in a modification of that of the Edinburgh Pharmacopœia, as follows :—

A wide-mouthed bottle, capable of holding seventy or eighty ounces of water, is graduated at sixty fluid ounces. Into this are introduced forty ounces (troy) of coarsely powdered sugar, and about thirty fluid ounces of water, and placed in a warm situation, so that as much as possible of the sugar may be dissolved ; into another, and smaller bottle, ℥iss. of iron filings, and f℥vj. or f℥vij. of water are introduced, and, by degrees, ℥iv. of iodine, the mixture well shaken at intervals until the solution becomes of a greenish colour; it is then filtered into the graduated bottle, and the whole made up with water to f℥lx., and continually shaken until all the sugar is dissolved, which very readily takes place.

It is necessary that the iodine should be gradually added to the iron filings, since the intense heat produced by their mutual reaction might possibly break the bottle, or cause the contents to overflow.

So prepared, the syrup has a slight greenish colour, and by immediately filling small bottles (℥viij. or ℥x.) up to the neck, and firmly stoppering, will remain without change for some months, more especially if the light be excluded. If the iodine employed be perfectly dry and pure, the syrup will contain thirty-two grains of iodine, or thirty-nine grains of anhydrous iodide of iron, in each fluid ounce, which is the strength ordered in the London Pharmacopœia.

The fact that I have not been able to prepare perfectly colourless syrup of Ph. L. strength, but that several wholesale houses send out a colourless preparation, professedly Ph. L., led me to search more thoroughly for a reason.

To this end, several samples were obtained from different sources, each possessing a different shade of colour, viz.—

No. 1, perfectly colourless.
2, a slight trace of colour.
3, a more decided tinge.
4, a yellowish-green colour.

The iodide of iron was estimated by precipitating the diluted syrup with as little excess as possible of a solution of bichloride of mercury, thoroughly washing the resulting precipitate of red iodide of mercury until the filtrate no longer gave a precipitate with nitrate of silver, carefully drying at a temperature ranging from 30° to 33° Cent., with the total exclusion of light.

The results obtained from a f℥i. of No. 1, after dilution with f℥ij. of water, were as follows :—

Weight of filter	24	grains
" of filter and precipitate	39	"
" of biniodide of mercury	15	grains

Now 15 grains HgI_2 = 8.3 grains I + 6.7 Hg, and 8.3 grains I combine with 1.8 Fe, forming 10.1 grains Fe I in each fluid ounce of syrup.

In order to verify the above results, a second experiment was performed, but instead of precipitating with bichloride of mercury ($HgCl_2$), the iodine was precipitated as iodide of silver (Ag I), by nitrate of silver, thoroughly washed

with water and dilute solution of ammonia (to remove any trace of chloride that might happen to be present), and carefully dried, as before, with exclusion of light. The results were then—

Weight of filter	21	grains
" of filter and dry precipitate...	38	"
" of iodide of silver (Ag I).....	17	grains

17 Ag I = 9.1 I + 7.9 Ag.

Now 9.1 I combine with 2.0 Fe, forming 11.1 Fe I.

The mean of the two experiments thus gave 10.5 grains of iodide of iron in each fluid ounce of syrup, or little more than one-fourth the P. L. strength. On treating No. 2 with bichloride of mercury (Hg Cl_2), as No. 1, carefully washing and drying the precipitate, the results were—

Weight of filter	26	grains
" of filter and dry precipitate...	48	"
" of Hg I_2.....	22	grains

Now 22 Hg I_2 = 12.3 I + 9.7 Hg, and 12.3 I combine with 2.7 Fe, forming 15.0 Fe I, that is, a little more than one-third the P. L. strength.

By similar treatment, No. 3 yielded as follows:—

Weight of filter	21	grains
" of filter and precipitate (dry)	61	"
" of Hg I_2	40	grains

40 Hg I_2 = 22.4 I + 17.6 Hg, and 22.4 I combine with 4.9 Fe, forming 27.3 Fe I, that is, nearly three-fourths the P. L. strength.

The results obtained from No. 4, were—

Weight of filter	24	grains
" of filter and dry precipitate...	76	"
" of Hg I_2	52	"

52 Hg I_2 = 29 I + 23 Hg, and2 9 I combines with 6.4 Fe, forming 35.4 Fe I, that is, rather more than five-sixths the P. L. strength.

Thus, of the four samples examined, none were of the Pharmacopœia strength, and one even more than three times the strength of another. It is also worthy of remark that the colour gradually increased with the amount of iodide of iron present, so that deficiency of colour, beyond a certain point, would seem to indicate deficiency in strength, although at the same time a deep colour would by no means be indicative of greater strength.

Such facts as these speak for themselves—they require no comment. We cannot be surprised at patients complaining of their medicines being different at every Chemist's, nor at Physicians being puzzled and disappointed at the effects of medicines; indeed, it would almost appear to assist homœopathy, for homœopathic globules, if inert, are at any rate uniform in strength and effect. If a patient takes sugar of milk globules, he never has cause to complain of one Chemist giving him a preparation three times stronger than that of his neighbour.

Absolute purity in medicines is not readily acquired, nor indeed is it actually necessary, since in most medicines the presence of one or two per cent. of impurity does not materially impair its efficacy; but when this little liberty is turned into a licence, so that medicines are prepared of only one-half or one-fourth the recognized strength, then it behoves every honest Chemist to point it out whenever he has an opportunity, so that his neighbours may be on their guard, that the patient may derive the full benefit of the prescribed medicine, and that the Physician may not be disappointed or puzzled at the effects of, it may be, a valuable and important medicine.

94, *St. John's Street Road, July 25th*, 1859.

TINCT. QUINÆ COMP. AND PIL. FERRI COMP.

BY MR. THOMAS SOUTHALL.

Tinct. Quinæ Co.—The Pharmacopœia directs sulphate of quinine to be *digested* in tincture of orange peel seven days, or till solution is effected.

As the digestion of spirituous liquids is a dangerous and undesirable process, I suggested, in a former number of the Journal, that a little acid should be added to facilitate the solution of the quinine.

The following formula will be found to answer :—

Sulphate of quinine, 5 drachms and 1 scruple.
Tincture of orange peel, 2 pints ; mix, and add
Diluted sulphuric acid, 5 fluid drachms and 1 scruple.
Dissolve and filter through paper.

The tincture in question is the only one in which digestion is ordered.

Pil. Ferri Co.—I apprehend there are few Chemists who do not understand the object of the College in this preparation.

The quantity of oxygen absorbed from the atmosphere during the few seconds required in rubbing protosulphate of iron and carbonate of soda together in making pil. ferri co. is perfectly immaterial, the protocarbonate being in great measure protected by the carbonic acid which is mixed up with and covers the effervescing compound.

I believe a little persalt is formed in the short and simple process I recommended in a former number of the Journal, which, as far as my experience goes, does not require a warm mortar, as by following the more laborious process of the Pharmacopœia.

In stating that an evolution of gas is caused by the excess of acid in sulphate of iron when mixed with carbonate of soda, I expressed no opinion whether it would occur when neutral sulphate of iron is used ; my object was to deal with the fact as I found it.

I have no wish to press my views in reference to either of the above preparations, but a little further explanation appeared to be required in consequence of the remarks of E. B. Muskett in the last Journal. E. B. M. states, referring, as would appear, to me, "his suggestion to keep it (pil. hydr. chlor. comp.) in powder is certainly objectionable," &c. I need scarcely inform the readers of the *Pharmaceutical Journal* that I have never made any suggestion whatever about this preparation, nor should I have thought of making the suggestion he has attributed to me.

E. B. M. is evidently in the *proto* period of life, and I wish to encourage him to persevere in his studies and investigations, believing that, after he has absorbed a little more of the PER-fecting element, and submitted to the expulsion of such volatile parts of his composition as are incompatible with the change thereby effected, he will make a sharp and able Pharmaceutist. His first attempt "to distinguish himself" is certainly a successful one, though in some of his observations he has shot a little beside the mark.

ARSENIC IN PYRITES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In the October number of your Journal there appears an article under the above heading, written by Mr. Henry Scholefield, Newcastle-on-Tyne, in which some strictures are made by that gentleman on some experiments of mine relative to the presence of arsenic in certain artificial manures, and its absorption by plants grown with such manures, which appeared in the September number of the *Pharmaceutical Journal*.

The writer of the article commences by observing that "there is nothing new

in the statement that plants are capable of absorbing arsenic from artificial manures, nor that the sulphuric acid used in their preparation, when made from pyrites, commonly contains arsenic." I believe the first part of this statement to be quite incorrect, but, if I am mistaken, I shall be much obliged to Mr. Scholefield to refer me to any published experiments which have been made prior to mine on the absorption of arsenic by plants grown with superphosphate and other manures which contain arsenic. As to the second part of his assertion, Mr. Scholefield must have greatly mistook the nature of my communication if he imagined that I set forward as anything new the existence of arsenic in pyritic sulphuric acid, a fact which is now so well known to every tyro in chemistry.

But though Mr. Scholefield admits that pyritic sulphuric acid *commonly* contains arsenic, yet he asserts that all pyrites does not contain that substance, and that large importations of that mineral from different parts of the Continent have been recently obtained, in which the presence of arsenic cannot be detected. With regard to this statement, I can only say that I should be greatly obliged to Mr. Scholefield if he would kindly furnish me with a specimen of that pyrites free from arsenic for examination, as I have, I must confess, considerable doubts as to the existence of such pyrites, as used by the vitriol maker; but if it is really the case, the manufacturers on the other side of the Channel have been extremely fortunate in obtaining such an article, as the pyrites used by the manufacturers in this country invariably contains a considerable quantity of arsenic, which renders the sulphuric acid made from it highly arsenical.

Mr. Scholefield objects to my use of the word brown as applied to the pyritic sulphuric acid employed for agricultural purposes. I am quite aware that the term brown does not of itself indicate the source from which the acid is obtained, for whether it is manufactured from pyrites or from sulphur it has a brownish colour, till it is concentrated to a certain point; but as that made from pyrites for agricultural purposes is usually not concentrated sufficiently to clear it or remove its brownish shade, I still maintain that brown acid is the commercial term which is usually employed, at least in this country, to designate the unconcentrated pyritic sulphuric acid which is used so extensively for agricultural purposes.

EDMUND WM. DAVY, M.B.

Royal Dublin Society, October 19th, 1859.

CULTIVATION OF MEDICINAL PLANTS AT HITCHIN, HERTS.

SOME years since there appeared in the pages of this Journal a series of papers entitled "Mitcham: its Physic Gardeners and Medicinal Plants;"* but as the cultivation of medicinal plants is not confined to Mitcham and the neighbouring districts, being also carried on in other parts of England, more especially at Hitchin, in Hertfordshire, where it is greatly on the increase, we propose to give some account of their cultivation in that district.

The cultivation of medicinal plants at Hitchin was commenced about forty years since by Mr. E. Perks, a Chemist and Druggist residing in that town. The first plant that he tried with success was lavender, but he afterwards cultivated several others. Having died at an early age, he was succeeded by his widow, and by her and his son the business is still carried on. Some years since the cultivation of medicinal plants was also commenced at Hitchin by Mr. William Ransom, Pharmaceutical Chemist, and he is now the largest grower in the neighbourhood. Messrs. Perks and Ransom are the only growers of such plants at Hitchin, and to them we are much indebted for kindly answering our inquiries.†

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* *Pharmaceutical Journal*, vol. x., pages 115, 168, 236, 297, and 340.

† We shall be much obliged to any correspondents who will furnish us with particulars of the cultivation of medicinal plants in other parts of the country.—ED. *Pharm. Journ.*

The cultivation of several medicinal plants has been attempted at different times—as, for instance, *lavender*, *elaterium*, *henbane*, *belladonna*, *aconite*, *savine*, *peppermint*, *lettuce*, *hemlock*, *poppy*, *liquorice*, *caraway*, *dandelion*, *colchicum*, *stramonium*, *&c.* At present the cultivation is principally confined to *lavender*, *elaterium*, *belladonna*, *henbane*, and *aconite*. To these plants, therefore, our notice will be almost entirely restricted; and as lavender is grown to a much greater extent than any other, we shall first allude to it, and describe it somewhat in detail, as no satisfactory account of its cultivation has been recently published.

1. LAVENDER.

The only districts in this country in which lavender is grown to any extent, are, we believe, those of Mitcham and Hitchin, and the only species cultivated in both localities in any quantity worth notice is the common garden lavender, the *Lavandula vera*, D.C.; and of this species, on an average of some years, there are about thirty-five acres under cultivation at Hitchin.

The soil best adapted for its growth would appear to be of a loamy nature, with a chalky subsoil. A loamy soil is, without doubt, that in which the lavender thrives best, but whether a chalky bottom contributes in any essential degree to favour its development, is uncertain, although this would appear to be the case, as in all soils about Hitchin in which the lavender succeeds best, chalk is found beneath the loam. The land in which it is grown should be freely exposed to the air and sun, and in a somewhat elevated locality, for it has been always noticed, that when lavender is planted in ground which lies very low, or which is surrounded by very high hedges, or in which there are many large trees growing, it is more liable to be injured by late frosts in spring, and to suffer most from blight and the other special diseases to which it is liable.

The lavender at Hitchin is always raised from *slips* or *cuttings*. These slips were formerly taken of small size, but it is now the more common practice to cut large vigorously growing pieces or branches from the mature plants. These cuttings are then planted in land which has been previously trenched about eighteen inches deep, and well manured. The planting is usually performed in September or October. Mr. Perks informs us that for two years past he has tried the experiment of planting the slips in the spring instead of the autumn, in consequence of the large number which are commonly destroyed during a severe winter, when planting takes place at the latter period; he finds, however, that the autumn plants are much stronger and not so liable to perish from the late frosts in spring, or to be injured by very dry weather. As soon as the plants begin to show the least signs of flowers in the following summer, they are carefully clipped, and this operation is repeated two or more times as may be necessary, in order to prevent the production of any flowers during the first season, for it is found that plants thus treated are ultimately much stronger and of a better shape than those which are allowed to flower. In the following October, when the plants are about twelve months old, or in the succeeding January, if the weather be fine and not frosty, they are planted out in *rows*, in land which has been previously well cleaned and manured. The plants in the rows are usually placed at about three feet apart, and a space of from three to four feet is also maintained between the rows. Mr. Perks thinks that a greater distance than four feet between the rows would be advisable, for he says that unless the plants are freely exposed on all sides to the air, they will not flourish so well, and will not bear such large flowers for a length of time, as when they are planted so as to preserve a greater distance between the rows. He further adds, that he has one hedge-row of lavender thus planted which is now twelve or fourteen years old, and this has always produced a fine and good crop; while in other rows of plants of about the same age, which have grown to a large size, so as to touch each other between the rows, the flowers are small, and the yield of oil inferior to that of the former. In reference to this opinion, we may remark that, there can be no doubt but that it is very

desirable in planting lavender, to preserve a free access of air and sun between the plants, as otherwise they do not grow so strong, or produce such large flowers. When too closely planted, they are also liable to a peculiar disease, which is supposed to arise from their own aroma producing a poisonous influence, owing to its confinement too much in the vicinity of the plants. But, at the same time, we think that for all practical purposes, a distance of three feet between the plants in the rows, and from three to four feet between the rows themselves, is amply sufficient, more particularly so, as it is usual to remove the plants after a few years' growth, and thus before they have arrived at such a size as to fill up the spaces between the rows. In the first summer after planting, that is, in the second year from the plants being raised from slips, it is sometimes the practice to commence cutting the lavender for the purpose of distilling the essential oil; but it is far better to keep the plants clipped through this summer, and not allow them to flower at all till they are in their third year of growth. The expense, however, of allowing them to remain so long unproductive is very great; so that when the oil is dear, the plants are sometimes allowed to bear flowers the second year, but by doing so the crops of future years are always injured. Those who desire a fine crop of lavender should therefore always reserve the plants for use till they are in the third year of growth. This is the more usual practice at Hitchin. In the second year of growth it is customary with Mr. Perks, in order to strengthen the plants still further, to supply the roots with a regular supply of short manure, or if this cannot be procured in sufficient quantity, to supply its place by superphosphate of lime, which he believes greatly improves their appearance and causes them also to produce finer flowers the following summer. Growers of lavender must be careful, however, not to over-manure the land in which it is planted, as it does not require a very rich soil, and thus, by so doing, the plants run to stem and leaf, and the crop of flowers is less abundant. In the third year of growth the plants bear well, and from this period till they are four or five years old, they are in perfection. They are commonly removed at the age of seven or eight years, but it is found that plants in different situations and localities vary much in the number of years in which they yield successfully.

Lavender is frequently liable to a kind of blight during the months of May or June, by which whole plantations are sometimes destroyed. Late frosts in the spring, as at the end of April or beginning of May, frequently also do very great injury, as was especially the case last season. When the plants are in flower they are also liable to a kind of disease, arising, as before noticed, from a poisonous influence exercised by their own aroma, especially when too closely planted. From these causes lavender is rather an uncertain crop, and hence the main cause of the fluctuation in the price of its essential oil.

A dry, warm season, with occasional showers, suits the lavender best. It is well known that English oil of lavender is always much superior to the foreign oil, even when the latter is obtained from the same species of lavender. The foreign oil is, however, commonly obtained from another species—namely, from the spike or French lavender, the *Lavandula spica*, D.C. When obtained from the same species, the difference between the oils of home and foreign production is due probably, in a great measure, to our more humid climate. The character of the soil and other causes also, without doubt, influence in an important degree the quality of the oil. Good English oil of lavender is commonly worth ten or twelve times as much as that derived from the French spike lavender.

The crop of lavender is gathered at the end of July or beginning of August, the time varying a week or more according to the character of the seasons. At about the 20th of July, in fine seasons, the lavender plantations have a beautiful appearance, and exhale a delicious perfume; they are then well worth a visit. The lavender flowers yield most oil and of the best quality when gathered in showery weather. A long succession of very hot dry weather preceding the

harvest is always injurious, the oil obtained having then always a more or less rank odour. The flowers should be gathered when fully expanded, as it is better to lose a few from their falling off the stalk in the process of gathering, in consequence of their ripeness, than to get them too young, as the oil is not then fully developed. The plan adopted by the two cultivators at Hitchin for cutting and preparing the lavender for the still, is different. Thus, one has the flower-stalks cut from the plants with a short reaping-hook or sickle; they are then tied up into bundles or sheaves, each of which weighs about thirty-five pounds. These are removed from the field and carried to the still-house, where they are prepared as soon as possible for distillation, for otherwise the lavender heats, and the quality of the oil is more or less injured. In order to prepare lavender for the still, the flowers are stripped altogether from the stalks, and received into pans of moderate size. This stripping is performed by women, two being placed to each pan. As the pans are filled, they are emptied upon a large cloth, and the flowers are frequently moved until there are sufficient for the still. The time required to obtain sufficient flowers for a still of 120 gallons by twenty-eight women, is six hours and a half. The other cultivator adopts a different plan to the above: thus, he has the lavender cut in the field as close to the flowers as is possible, it is then put into sacks without being tied into bundles, and conveyed at once to the still. He says that he has sometimes stripped the flowers altogether from the stalks according to the plan described above, but has found no material difference in the quality of the oil. He is, however, very careful not to have more stalks mixed with the flowers than can be avoided. It is necessarily more expensive to throw away the stalks and retain the flowers alone for distillation, as the labour of preparing the lavender for the still in the latter case is greater than in the former, and the oil which the stalks contain is also then lost, although the amount of oil obtainable from the stalks is very small as compared with the yield of the flowers. The additional expense of the oil obtained by using the flowers alone, has been estimated at ten shillings per pound. The admixture of a little stalk does not appear to be of much consequence, but it is very important to guard against any large amount being mixed with the flowers, for, as a rule, the greater proportion of the former to the latter, the less sweet the oil, and the more, in fact, does it resemble that of foreign origin.

In one case, the ordinary fire-still is employed for distilling the oil; in the other, the distillation is performed by steam heat. This plan is considered by some to possess many advantages over the former, as by such a process the lavender has no chance of getting burned, or the oil obtaining any empyreumatic odour from the application of a too great heat. On an average it is found that about 60 lbs. of good lavender flowers yield about 16 ounces of essential oil.

The yield of essential oil of lavender from an acre of land is, we are informed, on an average, about 6 Winchester quarts if old and young plants are taken together, but if all the plants from which the lavender is gathered are young, that is from 3 to 5 years old, then the produce will be about another Winchester quart per acre. As there are on an average about 35 acres of lavender cultivated in the neighbourhood of Hitchin, the total yield of oil from that district will be, therefore, not less than 210 Winchester quarts. All the oil produced at Hitchin is, we believe, used in the preparation of lavender water and other celebrated perfumes, the inferior oils, chiefly those of foreign origin, being employed for scenting soaps and pomades, &c.

The Hitchin oil of lavender has a remarkably fine, delicate, and sweet odour, being free from all rankness, and, at the same time, it possesses a very rich strong perfume. This oil is now becoming fully appreciated in the trade, where it is commonly quoted under the name of Hitchin oil of lavender. We believe that there can be no doubt that the best Hitchin oil is at least equal to any produced elsewhere. Its excellent quality is due to the favourable character

of the soil in which it is produced, to the very careful manner in which the plants are raised and cultivated, and to the fact of the flowers being either used alone for distillation, or, at all events, mixed with a very small portion of the stalk. We are convinced that nothing injures the quality of the oil so much as the admixture of any large proportion of stalks with flowers.

PHARMACY IN IRELAND.

[We have received the following communication relating to the state of Pharmacy in Ireland, with reference to which some further information may be obtained by reference to an article inserted at page 249.]

To the Governor and Company of the Apothecaries' Hall of Ireland.

Gentlemen,—Being a very old Licentiate of your Hall, and deeply interested in the progress of Irish Pharmacy, with which I have been practically associated for upwards of forty years, I cannot permit your circular, dated London, August 4th, 1859, but which only reached me upon the 15th inst., to pass unchallenged, calculated, as it manifestly is, to exercise a very serious influence upon Pharmacy in Ireland, and yet based, as it would appear to me to be, upon exceedingly erroneous inferences and more than questionable assertions, notwithstanding the very high source from which it emanates.

The circular in question purports to be a reply to some statement issued by the King and Queen's College of Physicians in Ireland, with which as yet I have had no means of becoming acquainted, except through the medium of your own review of it; and your object is to prove, in opposition thereto, firstly, that the Irish Apothecary has always been a recognized Medical Practitioner; and, secondly, that the Irish Apothecaries Act of 1791 was passed, not for the purpose of improving the education of the Dispensing Apothecary, but with the intention of providing the public with a better educated body of General Practitioners. Admitting your first proposition to be correct, at least to the extent of the Apothecary having been, as no doubt he formerly was, the subordinate of the Physician, and the family attendant in his absence, and in most cases of minor ailments—nay, even admitting him to have been inferentially recognized as a Medical Practitioner in certain enactments, which at once disposes of nine-tenths of your circular—and granting him to have been as ignorant as you please, and lamentably incompetent to discharge such important duties—granting all this, as I freely do, and assuming, as your circular does, that your Act of Incorporation was for the purpose of vesting in your body the power of remedying this state of affairs, surely it is not too much to expect that at least the evils to be corrected, and the means to be employed for the purpose, would be set forth intelligibly in the Bill. Yet here is its preamble:—

> Whereas not only many but great inconveniences have arisen from the want of an Hall, amply supplied with medicines of the purest quality, prepared under the inspection of persons well skilled in the art and mystery of such preparations, but also frequent frauds and abuses have been imposed and practised on many of his Majesty's subjects within the City of Dublin, and the liberties thereof, and in other parts of the Kingdom of Ireland, by the ignorance and unskilfulness of divers persons, pretending to the art and mystery of an Apothecary, to the injury of the fair trader, the disappointment of the Physician, and the imminent hazard of the lives of his Majesty's faithful and loyal subjects throughout the realm; And whereas the master, wardens, and commonalty of the Corporation of Apothecaries, and other Apothecaries of the City of Dublin, have by their petition humbly prayed that an Act be passed, enabling them to raise a fund for the purpose of erecting such Hall, with such clauses, powers, jurisdictions, and authorities, as may in future prevent such frauds and abuses, and thereby tend to preserve the health of his Majesty's subjects; Be it enacted by the King's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, that from

henceforth there shall be within the City of Dublin, and suburbs and liberties thereof, one company or fraternity of judicious Apothecaries, well skilled in preparing and compounding of medicines, to consist of one governor, a deputy governor, and thirteen directors, and the subscribers, &c.

We have no complaint here of ignorant and unskilful persons practising medicine, surgery, or midwifery, "to the imminent hazard of the lives of his Majesty's subjects," but the "judicious Apothecary" is clearly and unequivocally designated an individual "*well skilled in preparing* and *compounding* of *medicines*," and in the "*art and mystery of such preparations*," whilst the evils consequent upon the Apothecary being ignorant and a pretender are set forth as "injury to the FAIR TRADER, and *disappointment* to the *Physician*," the professed intention of the Bill being "to prevent in future such *frauds* and *abuses*," and the means to be employed being explicitly set forth as follows in

CLAUSE 22, page 68.—And be it further enacted by the authority aforesaid, that from and after the 24th day of June, in the year of our Lord One thousand seven hundred and ninety-one, no person shall open shop, or act in the art or mystery of an Apothecary within the kingdom of Ireland, until such person shall have been examined as to his qualifications and knowledge of the business by such persons and in such manner as herein before mentioned, &c.

To any common understanding such language might possibly appear to be clear and unambiguous. Nevertheless such, it would seem, cannot be the fact, for in the 17th clause, which relates to the purchase and sale of the Company's stock, is it not twice distinctly enunciated that no person other than a "judicious *practising* Apothecary," resident within the city of Dublin, or the suburbs thereof, shall be legally entitled to purchase and hold the same?—this mystic term "judicious *practising* Apothecary" not having been employed, as some might superficially imagine, to ensure for the government and superintendence of the Hall a constant supply of governors practically conversant with "the art and mystery of preparing and compounding medicines," the same being resident in Dublin, but having in reality been introduced, so at least you authoritatively announce to us from LONDON through your Secretary, Dr. Charles Henry Leet, for the purpose of masking the true design of the Bill, and enabling you, under shelter of its protecting ægis, to convert what the unenlightened had idly imagined might one day have been legitimately expanded into something akin to a College of Pharmacy into an insignificant school for the education of General Practitioners.*

Of course, it is impossible for you to be in error on such a point; nevertheless, it is somewhat remarkable that the original promoters of the Bill laid claim to no such knowledge, but left the important discovery for you. My *licence* to practise the *business* of an Apothecary—BUSINESS, mind you, not *profession*, as you now more genteelly designate it in your quasi-diploma—bears date January, 1823, nearly thirty-two years subsequent to the passing of your Act; yet, even with this ample interval for consideration, your predecessors who examined me were either so negligent of their duty or so unconscious of their powers as to have confined my examination to pharmacy, chemistry, materia

* The College insists that the Hall was established exclusively "for the qualification of a skilful class of Pharmaceutists, whose business it is to prepare and compound medicine." To which the Hall replies:—"The fact is, that none except 'judicious *practising* Apothecaries' can become purchasers of shares in the capital of the company; any party inheriting a share lapsed by death, if not an Apothecary, being wholly incapacitated from voting in the Council, or from exercising any corporate privilege. Moreover, the Act is completely silent as to the term 'Pharmaceutist;' but in the place of it, the specification 'the art and mystery of an Apothecary' obtains throughout." The Hall, however, seems to have overlooked the fact that the "art and mystery of an Apothecary" is defined by their own Act, as has been already shown, to be the "art and mystery of preparing and compounding medicines," and that the word "Pharmaceutist" is a term of comparatively modern origin, invented to express in a concise form these very peculiarities, and rendered necessary by the perversion of the term Apothecary from its original meaning to that of a designation for General Practitioners.

medica, and botany, not propounding to me even one solitary question upon midwifery, anatomy, practice of medicine, or any of the other collateral subjects which at present you deem indispensable for your certificate. But this is not the only astounding discovery you have made; here is the 25th clause of your Act, page 73:—

> And be it enacted by the authority aforesaid, that from and after the twenty-fourth day of June in the year of our Lord One thousand seven hundred and ninety-one, no Apothecary within the kingdom of Ireland shall have, take, receive, indent, or hire any apprentice to learn the art and mystery of an Apothecary for a lesser time or term than seven years from the day of the date of such indenture, article, minute, memorandum, or agreement, and every such indenture, article, minute, memorandum, or agreement, shall bear date really and truly the day of such indenture, article, minute, memorandum, or agreement shall be signed, executed, or entered into.

And this is the oath which each of your members is obliged to take before he can vote in any General Court:—

> Clause 10, page 31.—I, A. B., do swear or affirm that I will be faithful to the Governor and Company of the Apothecaries' Hall of Dublin, whereof I am a member, and in all General Courts, when and so often as I shall be present, will, according to the best of my understanding, give my advice, counsel, and assistance for the support and good government of the said corporation; and that I will not take an apprentice for a shorter term than that of seven years; and that I will not knowingly or willingly buy or retail any contraband goods.
> So help me God, Amen.

No wonder, therefore, that, to the audacious allegation of the College, "that not requiring apprentices to serve seven years is 'a discouragement to the practice of Pharmacy, and is in effect a violation of the Act of Parliament,'" you reply, with such ineffable dignity and composure, "But the Act does not declare such servitude to be legally necessary, and so far the Hall is at liberty to fix the term which it may deem sufficient for acquiring the requisite knowledge;" or that, in compliance with the Act and in obedience to the obligation of your oath (thus interpreted), you have reduced the term of Apprenticeship to three years. It appears further, also, that the College of Physicians has sadly misinterpreted the 23rd section of your Act, by which it is constituted a court of appeal, with power to re-examine your rejected candidates—to reverse your decision, should it see fit—and to grant to any person so appealing a certificate authorizing him to open shop and to commence the business of an Apothecary, "such certificate to be as good, valid, and effectual in law to all intents and purposes as if the same had been granted by the examiners in the first instance." Now the College, it would seem, is of opinion "That there does not appear to be any provision or authority in the Apothecaries Act for examining in medicine, and grants to the appellant candidate the right to practise the art and mystery of an Apothecary without any examination in medicine;" whilst you, who are better informed on the subject, think otherwise, and thus considerately set it right:—"But this opinion, derived, as it has been clearly shown, from a wrong and partial view of the Act, must, under such cumulative evidence of a contrary nature, fall to the ground, and a sense of duty hereafter constrain the College to test the candidate as 'to his qualifications and knowledge in medicine,' this being the special department of a College of Physicians, and therefore this appeal is provided for the rejected 'Apothecary' candidate under the Act; there being no similar right of appeal (a fact worthy of notice) in the case of the rejected 'Assistant,' whose business it is to compound and dispense medicines only." Perhaps you can explain, with similar modesty and candour, what the Legislature really intended by introducing into the 16th section of your Act, relating to the forming of Bye-laws, the following restriction:—

> Clause 16, page 50.—So as that such bye-laws be not repugnant to the laws

> of the kingdom of Ireland, and so as that no bye-law, statute, or ordinance for or concerning the composition of medicines, shall be made without the approbation of the College of Physicians by writing, under the College seal, first had and obtained;

or how it came to pass that the preparation and publication of the National Pharmacopœia, a work so much out of its "special department," should have been entrusted to the College, whilst for you veritable "*practising* Apothecaries" was only reserved the unimportant duty of examining candidates in Anatomy, Surgery, and the trifling array of similar *et cæteras*, which stands out so diffidently in your modern curriculum. It has been asserted before now that language is only a contrivance invented to enable man to conceal his thoughts, but never, till I studied the Irish Apothecaries Act of 1791, coupled with your perspicuous and ingenuous corrections of its delusory provisions, was I in a position fully to appreciate the appropriateness of the figure.

To be serious, however. It is now, gentlemen, some thirty years or more since you commenced your career of innovation, and since I and other members of your body denounced in the public press your aggressive and suicidal policy —but in vain! Unhappily you have succeeded but too well in destroying and disembodying the vital structure with the care of which you were entrusted, and from its *membra idsjecta* have constructed a Medical Frankenstein, a sort of Pharmaceutical Hermaphrodite, spurned and despised alike by those upon whom it would impotently obtrude itself, and these to whom it should of right have been allied. It is now, alas! too late to correct an evil the growth of thirty years, and hopeless to do more than utter an indignant protest against the presumptuous imbecility which has abused and misemployed such noble opportunities. In your ambition to compete with the Apothecaries' Company of England, you seem altogether to have overlooked the important distinction between the two corporations—the English Company having been most stringently prohibited from interfering in any manner with the administration of Pharmacy, which was thus left utterly at the mercy of the ignorant and incompetent, whilst the entire government and control of Pharmacy in Ireland was placed in your hands, no person being legally entitled to open a shop for retailing or dispensing medicine without your licence, and your powers for dictating a *proper* system of education being all but unlimited. Had you been satisfied with your legitimate vocation, and applied your energies and powers to the development and advancement of Pharmacy, you might long ere now have established a School of Pharmacy, which would have been an honour to this country, and an example to the less favoured sections of the empire. But you elected to become Practitioners, and you are so. "The law allows it, and the court awards it."* But this, instead of being a result to glory in, is but the consummation of your folly. You have mistaken the temper and requirements of the age—an educated public is no longer to be contented with semi-qualified Practitioners—and what man of gentlemanly feeling, intending to adopt medicine as his profession, would submit to the humiliation of an examination from you "*practising* Apothecaries" for a medical certificate, which would not open up to him even such an appointment as a country workhouse or dispensary, when, for an equivalent expenditure of time and labour, he may receive from some body of educated and scientific men a diploma, which will entitle him, if he possesses the ability, to compete for the highest prizes in the profession. In one word, your medical certificate is simply a "mockery and a delusion," and you know it; else why have you so generally considered it expedient or desirable to distinguish

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* If the following legal opinion with respect to the proper interpretation of the Medical Act be correct:—

"That the Act confers upon the party registered a title to practise medicine or surgery according to the nature of his qualification, and that the admission of licentiates of the Hall to be so registered, amounts to a legislative declaration of their right to practise medicine."—Extract from an opinion by Theobald A. Purcell, Esq., Barrister-at-Law. See your own circular.

yourselves from mere "*practising* Apothecaries" by the affix of M.D. On the other hand, the necessities of the community, and the increasing tendency to a more perfect division of labour in every department of industry, is gradually creating in this country a body of Pharmaceutists unconnected with medical practice, in the way of whose legitimate education you have thrown every possible obstruction,* and for whose professional wants you have shown yourselves so incompetent to provide, that your government and control over Pharmacy is every day becoming more and more ineffectual, and must inevitably before very long be transferred to other hands. Your "*Mene, Mene, tekel, upharsin*" is already legible upon the wall, and requires no prophetic seer to interpret its self-evident meaning. So soon as the Legislature shall invest, as sooner or later it must do, the Pharmaceutical Society of Great Britain with power to enforce its curriculum and examination, to its more appropriate and sagacious keeping will have to be entrusted, for the security of the public and the advancement of Pharmacy, that authority which, by your insane ambition, you have contrived to render both inoperative and contemptible.

I have the honour to remain, Gentlemen,
Your very obedient Servant,
JOHN GRATTAN,
Dispensing Apothecary.

Belfast, September 17th, 1859.

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* In reference to the charge brought by the College, "that the Company, in qualifying their licentiates to practise medicine, have practically discountenanced the pursuit of pharmacy," the Company observe (with no little self-complacency) that they "have only to point to their curriculum, mode of examination, and the public repute in which practical Pharmacy is held in Ireland, in order to displace this charge."

This precious curriculum, which confers so many benefits upon Pharmacy, is here appended for the edification of the pharmaceutical public, by whom it will scarcely be credited that in Ireland no person can at present *legally* open a shop for the retailing of medicine, or perform the duties of a Dispensing Apothecary or Chemist, who has not previously complied with its demands, and undergone the ordeal of an examination in its multifarious topics. The natural consequence is that, while the Hall employs itself in manufacturing mongrel practitioners, Pharmacy is left to shift for itself, and the law is notoriously and extensively infringed.

Curriculum of the Dublin Apothecaries' Hall.—Aug. 8th, 1859.

Preliminary Education	Greek and Latin Classics, French, Mathematics, Arithmetic, and English Composition.
Pharmacy and Dispensing Practice . . .	Three Years.
Chemistry	Six Months !!
Anatomy and Physiology	Twelve Months !!
Dissections	Twelve Months !!
Botany	Three Months.
Materia Medica and Pharmacy	Six Months (or three with an extended course).
Practical Chemistry	Three Months !!
Practice of Medicine	Six Months.
Midwifery & Diseases of Women & Children,	Three Months.
Surgery	Six Months.
Medical Jurisprudence	Three Months.
Clinical Lectures	Two Years !!
Hospital Attendance	Two Years !!
Midwifery Practice	Thirty Cases.
Pathological Anatomy	Six Months.

To what extent the interests of Chemistry and Pharmacy are represented in this tolerably extensive course of education the curriculum itself will show; and how well merited is the Company's self-laudation on the subject may be partially inferred from the accompanying *fac-simile* of the *printed label* by which, in Ireland's model School of Pharmacy, they designate in language the symbolic compound (K Br):—

Potassæ Bromidium.

Apothecaries' Hall, Mary Street, Dublin.

PHARMACY IN BELFAST.

Summary of the Medical and Pharmaceutical Elements of the Belfast Population compiled from the Belfast Directory from 1858.

Estimated population	125,000
Legally qualified *Physicians* or *Surgeons*, unconnected with Pharmacy	47
Ditto, ditto, who keep Apothecaries' shops without holding the Dublin Apothecaries' Hall's licence	19
Ditto, ditto, who keep shops and hold the Hall's licence	7
General Practitioners who keep shops and practise medicine upon the Hall's qualification alone	2
Dispensing Chemists who hold the Hall's licence but do not practise medicine	3
Wholesale Druggists, Drysalters, &c., who do not hold any qualification, and who retail medicine, but do not dispense	10
	88

Thus it would appear, so far as Belfast is concerned, that the Hall, for the barren and nugatory privilege of contributing two general practitioners to the medical staff of the town, has abdicated its legitimate and vastly more important office of protecting its pharmaceutical interests—twelve only of the retail and dispensing establishments of the town submitting to its authority, whilst twenty-nine retail or dispense in defiance of it, frequently through the instrumentality of utterly ignorant apprentices or assistants, to the manifest deterioration of Pharmacy generally, and the serious peril of the public safety.

Belfast. JOHN GRATTAN.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On Metallic Chromium.—M. F. Wöhler* has shown that metallic chromium may be readily obtained by reacting upon the violet chloride of chromium with zinc. The operation is conducted as follows:—A mixture is made of one part of chloride of chromium with two parts of a double chloride of potassium and sodium (consisting of seven parts of Na Cl and nine parts of K Cl), and introduced into an ordinary crucible; two parts of finely granulated zinc are placed in a layer over its surface, and the whole is then covered with another layer of the flux (the double chloride). The crucible so charged and fitted with a cover is gradually heated until the mass becomes incandescent and enters into fusion; as soon as the ebullition of the zinc is heard, and a green flame is perceived on raising the crucible lid for an instant, the intensity of the fire is diminished, and the mass maintained in fusion for about ten minutes longer. The crucible is then removed, gently shaken, in order to collect the metal into one mass, and allowed to cool. When broken and the contents examined, a lump of fused zinc is found beneath a green scoria. This metal is well washed with water and dissolved with heat in nitric acid; the chromium remains in the form of a grey crystalline powder. Thirty parts of the violet chloride furnish from six to seven parts of chromium.

The chromium thus prepared constitutes a brilliant crystalline powder, having a density of 6.81, and resembling tin in colour. When heated, in contact with air it assumes, in the same manner as steel, first a yellow, and then a blue tint, but does not burn; it is slowly coated over with a thin layer of green oxide, but the oxidation is very incomplete. Heated in the oxy-hydrogen flame it burns, but less vividly than iron. Thrown into fused chlorate of potash it burns with a bright white light, forming chromate of potash. It is readily oxidized by fused nitre, but without the emission of light. It is unacted upon by fused carbonate of soda.

Metallic chromium is dissolved by hydrochloric acid, with disengagement of hydrogen and formation of the blue chloride. It is unacted upon by dilute sulphuric acid in the cold, but when heated a lively action is set up, if the metal be then taken out

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* *Annales de Chimie et de Physique.*

of the acid and washed it is found to possess the property of being attacked in the cold by very dilute sulphuric acid. Nitric acid, even boiling, is without action on metallic chromium.

In an attempt to prepare the chromium with cadmium, in the place of zinc, the mixture, when brought to the fusing point, decomposed with explosion. Magnesium effects the reduction tranquilly, but presents no advantages over zinc. The violet chloride of chromium is prepared for these experiments, as usual, by passing chlorine gas over an intimate mixture of oxide of chromium and carbon at a red heat.

On a new Acid obtained by the reduction of Picric Acid.—M. H. Hlasiwetz* has been led to study the action of cyanide of potassium as a reducing agent upon some nitrous combinations. Upon treating carbazotic acid (picric or nitrophenylic acid) with this substance, he obtained an acid the salts of which have a most magnificent colour; he has therefore named it *Isopurpuric Acid.*

Two parts of cyanide of potassium (prepared by Liebig's process) are dissolved in four parts of water, and the solution heated to 60° Cent.; one part of picric acid, dissolved in nine parts of water, is then added little by little. The liquid assumes a deep blood-red colour, and deposits small crystals of a deep colour; it exhales a strong odour of prussic acid and ammonia, and upon cooling sets into a thick mass. After some hours this is thrown on to a filter and strongly pressed. A crystalline mass of a brown colour is thus obtained, which is first washed with cold water and then dissolved in a large quantity of boiling water. On cooling, the filtered solution becomes covered with a crystalline crust, of a metallic green colour, and deposits small brownish-red crystals, which are green by reflected light. These crystals constitute the potash salt of the *isopurpuric acid.*

This salt is but little soluble in cold water, very soluble in boiling water; the solution is of a pure purple, and so intense, that a few particles are sufficient to colour a large mass of water. Heated on platinum to about 215° C., the isopurpurate of potash detonates with a feeble light.

Isopurpurate of Soda is formed by the reaction of cyanide of sodium upon picric acid. This body is much more soluble than the potash salt.

Isopurpurate of Ammonia is precipitated when a concentrated solution of the potash salt is mixed with a salt of ammonia. It forms deep brown-red crystals having a metallic lustre. Little soluble in cold water, they dissolve in boiling water with a magnificent purple colour. Heated upon platinum, they instantly burn like gunpowder. In its optical and crystallographic properties this salt much resembles murexide.

Isopurpurate of Baryta is formed by mixing solutions of isopurpurate of potash and chloride of barium—a precipitate is obtained of an almost vermilion red, soluble in boiling water. Isopurpurate of lime is formed by double decomposition like the preceding salt. It is deposited in the course of twenty-four hours in the form of fine green needles of a metallic lustre. Isopurpurates of silver and lead may be formed by similar means; they are insoluble in water.

Like purpuric acid, isopurpuric acid cannot be isolated; when a concentrated solution of isopurpurate of potash is treated with sulphuric acid, the salt is decomposed, and the purple passes to a yellow, the liquid at the same time exhaling a penetrating odour, probably due to cyanic acid. Like purpuric acid also, isopurpuric acid appears to be bibasic, but it is difficult to prepare the neutral salts. When potash is added to a solution of isopurpurate of potash, the liquid assumes a magnificent deep violet colour, and a deeply coloured substance is precipitated, which probably constitutes the neutral salt, but it undergoes rapid alteration. Analogous results are obtained by treating the baryta and ammonia salts with excess of base. In mixing a solution of isopurpurate of potash with ammoniacal nitrate of silver, a gelatinous brown-violet precipitate is formed, which consists of a very basic silver salt, analogous to that which is formed under the same circumstances with murexide.

Isopurpuric acid has a composition which may be represented as $C_{16}\,H_5\,N_5\,O_{12}$, the potash salt being $C_{16}\,H_4\,KN_5\,O_{12}$. Its formation may be explained by the equation

$$\underbrace{C_{12}\,H_3\,N_3\,O_{14}}_{\text{Carbazotic Acid.}} + \underbrace{3(C_2\,N\,H)}_{\text{Hydrocyanic Acid.}} + 2\,HO = \underbrace{C_{16}\,H_5\,N_5\,O_{12}}_{\text{Isopurpuric Acid.}} + C_2\,O_4 + NH_3$$

* *Annalen der Chimie und Pharmacie.*

ARSENIC IN SUPERPHOSPHATES.

The alleged discovery of arsenic in superphosphates and in the product raised with it, as referred to in the *Gardeners' Chronicle* of the 10th inst.,* being likely to excite unnecessary apprehension, or at least to rekindle the prejudice but scarcely extinguished in the minds of some persons against the above-named invaluable manures, I venture to offer some additional evidence on this matter.

That arsenic is likely to be present in superphosphates will be admitted by every one who is acquainted with the sources whence the manures are prepared; but that its presence in these substances is rare, and that its quantity when present is generally exceedingly small, may not be so well known as to render its announcement unproductive of satisfaction.

With the view of ascertaining to what extent we are likely to suffer from the presence of arsenic in manures of this description, I made some experiments, the results of which may perhaps be interesting, and may possibly tend to allay any anxiety which the mere announcement of such an apparently startling fact as that above mentioned is not unlikely to create.

I first examined for arsenic several samples of white and brown sulphuric acid, the material most likely to contaminate superphosphate with arsenic. These samples were taken from different sources, and although this acid not unfrequently contains arsenic, none of these samples contained any. As is well known, sulphuric acid is prepared not only from sulphur, but also from iron pyrites, a mineral that often contains arsenic, and which is therefore likely to impart this substance to the acid prepared from it. But the iron pyrites commonly used for this purpose do not contain so much arsenic as is generally supposed; indeed, of many samples I have analyzed for manure makers (many of whom, I need scarcely say, prepare the acid they require in the manufacture of superphosphate) and others, several have contained no arsenic, others but traces, and few more than .50 per cent.

I next examined for arsenic several samples of superphosphate obtained at different times from some of the largest makers; the samples used in two or three cases had been taken from very large quantities of this article. Of eight samples examined seven contained *no* arsenic; the eighth contained faint traces. In order to check the correctness of these negative results I prepared a solution of arsenious acid of known strength, by means of which small quantities of the poison might be added to the materials employed in the experiments.

I may remark that the means I used for testing these manures was the test known as "Marsh's," but should have proceeded to employ other tests had the results obtained by this one been positive, or seemed to require further evidence. I should also have examined a larger number of samples had the results obtained from a few been different to what is above stated.

By using the solution of arsenic above noticed, strong reactions for arsenic were obtained from quantities considerably smaller than $\frac{1}{1000}$ of a grain, and this in the presence of superphosphates, so that any objection that might be raised from the possible occurrence of materials in superphosphates which prevent or retard the elimination of arsenic by this test might be overcome. But in order still further to be secure on this point, some arseniate of lime was prepared (the compound of arsenic that would probably occur in superphosphates) and minute quantities tested in the same manner in the presence of superphosphate, and with equally good results.

The sample of superphosphate which contained arsenic was made at a manure works where pigments occasionally containing arsenic are known to be used, but the quantity of arsenic present was far beyond the limits of a quantitative determination, and must have been exceedingly minute. Even supposing it to be as much as .01 per cent. (although the comparative experiments above described showed it to be much less), and assuming that plants are capable of taking up arsenious acid in the same ratio as they do phosphoric acid (a matter that certainly requires to be further investigated), we may calculate that the quantity of arsenic likely to be present in a turnip crop is by no means formidable. Supposing an acre of land to yield 20 tons of Swedes, and that 3 cwt. of superphosphate, containing 33 per cent. of phosphate of lime and .01 per cent. of arsenious acid have been used, each cwt. of roots would contain about half a grain of arsenic—a proportion of not more than .00006 per cent. —*Alfred Sibson, Royal Agricultural College, Cirencester.—Gardeners' Chronicle.*

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* See also *Pharm. Journ.* for September and October of the present year, pp. 187 and 216.

ON THE ABSORPTION OF ARSENIC BY PLANTS.

The statements of Dr. Edmund Davy (referred to in the leading article of the *Gardeners' Chronicle* of Sept. 10), to the effect that certain pea plants which he had watered with a cold saturated solution of arsenious acid, not only absorbed the poison, but actually throve in it, came to perfection, and matured seeds, in which and in every other portion of the plants arsenic could be readily detected, were, as you justly observed, of so startling a nature, that I was induced at once to make a few experiments on this subject, the results of which I now beg to lay before you. The late period of the season prevented my trying upon peas, but in default of these I transplanted two broccoli plants, two cabbage plants, and four lettuces, into six separate pots, and sowed in two other pots seeds of mustard and cress, and allowed several days to elapse, in fact until the seeds had germinated. I then watered all these various plants with a saturated solution of arsenious acid (made with cold water), and after about eight hours the plants all dropped their leaves, though care was taken not to touch the leaves with the solution. On the second day I did not water them, but they did not seem to recover at all. On the third day a second dose was given them, and on the fourth day all the plants were quite dead, and the mustard and cress (which had already sprouted) had shared the same fate. I next watered a small piece of grass and that died also, and the shoots of a rose-bush which I dipped into the same solution soon turned black, and at the end of two days was completely withered. These results being apparently quite opposed to the statement of Dr. Davy, I thought that it might be objected that the plants had not been transplanted long enough to afford a fair trial. I therefore watered with the same solution a broccoli plant which was growing in the garden very luxuriantly, perhaps a foot high, and very strong. This was watered on the 17th Sept., and after ten hours it fared the same fate as the other plants. I continued to water this plant every other day, and on the sixth day very little of the plant was remaining. It appeared as it were burnt up, a section of the stem presenting a black morbid appearance. My next experiment was on three other broccoli plants growing in the same piece of ground as the one just mentioned, and planted at the same time, and these I watered with solutions of different strengths. No. 1 was watered with a solution made of 30 grains of arsenic and 60 oz. of water, and this solution was divided into six parts, and one part given every other day to the roots of the plant. No. 2 was treated with a solution made of 15 grains of arsenic and 60 oz. of water; and this also was divided into six portions as in the first case. In No. 3 a very dilute solution of $7\frac{1}{2}$ grains of arsenic to 60 oz. of water was applied. I consider, therefore, that No. 1 had 30 grs. of arsenic, No. 2, 15 grains, and No. 3, $7\frac{1}{2}$, applied to their roots; and this I thought would be amply sufficient for the detection of arsenic if absorbed by them at all. The plants continued to look healthy, and as no signs of their having been poisoned was visible, I cut them off just above the ground, and examined them chemically for arsenic. A section of the stem showed nothing uncommon, and after a very careful examination I failed to detect any trace of arsenic in either of these three plants. Under these circumstances I cannot help doubting very much the correctness of the statement that plants will absorb arsenic at all; and even if they could, I see no ground for apprehension that they could derive it in any quantity worth noticing from any of the superphosphates now in general use; and I am greatly confirmed in this view of the case by the interesting and able remarks by Mr. Sibson in your last week's paper to the same effect.—*E. S. Kensington, F.C.S., F.R.A.S., Dartmouth, October 3.—Gardeners' Chronicle.*

ARSENIC IN MANURES AND CROPS.

Chemico-Agricultural Society, Ulster, Oct. 7.

Professor Hodges said that his attention had been directed to some newspaper extracts, and also by a letter published in the *Belfast Daily Mercury*, to a communication to the Royal Dublin Agricultural Society, by Professor Davy, on the introduction of arsenic into the turnip and other crops grown upon superphosphates prepared from oil of vitriol (sulphuric acid) manufactured from pyrites. The presence of arsenic (Dr. Hodges remarked) in vitriol made from some varieties of pyrites had long been known, but it was also known that many kinds of pyrites used in the manufacture did not contain any arsenic. The impregnation by arsenic of wheat which had been grown from seed which had been steeped in arsenical solutions for

the destruction of the spores of the smut, had at several times occupied the attention of chemists, especially in France, where it was at one time alleged that the practice might be attended with injurious consequences. The numerous investigations which had been made had led to the conclusion that no arsenic could be detected in the crops raised from grain which had been so prepared, and in one of these experiments M. Girardin had failed, even whilst employing 4 lbs. of corn grown from seed treated with arsenic, to obtain any evidence of the presence of poison. Even, therefore, did the manure contain a small amount of arsenic, which was, however, not always the case, little apprehension need be entertained of any injury to health from its employment. In reasoning on this subject, it must not be forgotten that if arsenic was likely to be introduced into the animal system by the use of vegetables grown upon arsenical superphosphates, traces of it would be the more frequently discovered in the course of the delicate analytical investigations required in medico-legal investigations, even where no criminal administration of that poison had taken place. Yet, in an experience of 20 years during which he (Dr. H.) had made more than a hundred toxicological examinations, he had not discovered its presence in any case in which there was not good reason to suppose that death had been produced by criminal doses. He was entirely opposed to the statement that arsenic was what is termed an accumulative poison ; that is, that by the continued use of vegetables containing a minute trace of it, the poison may collect in the system, till its effect may exercise an injurious effect on the health of man and animals. People were easily alarmed by such statements, and occasionally nervous individuals were made very uncomfortable by them. Some time ago accounts of the production of disease by room-papers coloured by arsenical compounds excited great uneasiness. He had been requested by a physician in Belfast to examine some room-papers which, it was asserted, had produced on an individual a long train of serious symptoms, precisely resembling those of arsenical poisoning. Yet the papers, on examination, did not contain a trace of arsenic. It was true that many room-papers did contain arsenic, and also that in superphosphates there might occasionally be a small amount of arsenic ; but we require further investigation on this subject before the apprehension of death in the pot obliged us to abandon the use of vegetables grown on artificial manures.—*Gardeners' Chronicle.*

SYRUP OF PHOSPHATE OF IRON AND MANGANESE.

In the absence of any authorized formula for this syrup, and in answer to several correspondents, we insert the following:—

Take of Phosphate of Iron, 72 grains.
Phosphate of Manganese, 48 grains.
Glacial Phosphoric Acid, ʒvi.
Sugar, ʒx.
Water, sufficient to make f. ʒxij.

Di olve the phosphoric acid in a small quantity of the water, add the phosphates, and apply heat till dissolved, then add the sugar and the remainder of the water, so that the product may measure twelve fluid ounces.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The twenty-ninth meeting of this Association took place at Aberdeen, and lasted from Wednesday, the 14th, to Wednesday, the 21st of September, under the Presidency of His Royal Highness the Prince Consort.

On the first day the General Committee held their preliminary meeting in the Library of Marischal College, when the minutes of the last two meetings were read and approved, after which Professor Phillips read the Report of the Council.

The General Meeting of the Members was held in the evening at the Music Hall, a building calculated to accommodate conveniently two thousand seven hundred persons, and, notwithstanding that the issue of Associate tickets had been suspended in the early part of the day from a fear of overcrowding the meeting, every part of the room was filled before the proceedings commenced. Professor Owen, the retiring President, having congratulated the Association on its prosperous condition, retired from the chair, which was taken by H.R.H. the Prince Consort, who proceeded to read a very excellent address, which occupied about forty minutes.

The business of the Sections commenced on Thursday morning, the 15th.

In the Chemical Section, Dr. Lyon Playfair, the President of this section, in his opening address, referred to the remarks which had been made by his predecessor in the chair, Sir John Herschel, last year, who directed attention to the great importance of studying, with increased accuracy, the combining proportions of bodies, in the hope of determining the exact numerical relations which prevail between the elements. He justly regarded it as a subject worthy of the most accurate experiment, to ascertain whether the combining proportions of the elements be multiples of the combining proportion of hydrogen, as suggested by Prout; cautioning chemists at the same time not to accept mere approximative accordances as evidence of this relation. He (Dr. Playfair) congratulated the section on the publication of the laborious investigations of Dumas on this important inquiry. It required a chemist of great manipulative skill, as well as of fertile experiment, to obtain combining numbers for the elements upon which a greater reliance could be placed than upon those determined with such admirable precision by Berzelius, the great master of analysis. The atomic weights found by that chemist did not, for many of the simple bodies, confirm the suggestion of Prout as to the multiple relations of these numbers to the equivalent of hydrogen. At the same time, the more recent determinations for the atomic weights of carbon, silver, and some other elements, so closely coincided with this view, that it was very desirable to extend new experiments to the bodies which had fractional atomic weights assigned to them. In M. Dumas' Memoirs there were the results, though not the details, of a large series of experiments on many of the elements. He obtained numbers of precisely the same values as those obtained by the Swedish philosopher—numbers which are not multiples of the equivalent of hydrogen. But when he applied his methods of discovery and inventiveness to the further investigation of the subject, it was found that atomic weights could be deduced which were multiples of that of hydrogen, or at least stood in a very simple relation to it. Hence the general views of Prout, that the equivalents of the elements, compared with certain unities, are represented by whole numbers, seem to be supported by recent experiments, although it would be premature to say that there are no exceptions to the law.

He referred also to the proposals which had been made by some chemists, to double the equivalent numbers for oxygen and carbon, but expressed himself unfavourable to such a change at present.

The following is a list of the papers brought before this section, of which we give here merely the titles, as the notices of them hitherto published are too imperfect to be of any real value:—

On the Stages which led to the Invention of the Modern Air-Pump.—Professor G. Wilson.

On the Fluorescence and Phosphorescence of some Diamonds.—Dr. J. H. Gladstone.

On the comparative Value of certain Salts for rendering Fibrous Substances Non-inflammable.—Messrs. Versmann and Oppenheim.

On the Analysis and Valuation of Manures.—Dr. S. Macadam.

New Process of Preserving Milk perfectly pure in the natural state, without any chemical agent.—M. l'Abbé Moigno.

On a symmetrical representation of Oxides and Salts on a common type.—Dr. Lyon Playfair.

On the Molecular Movements of Fluids.—The Master of the Mint.

On the ageing of Mordants in Calico Printing. Communicated by Professor G. Wilson, with Observations and Illustrations.—Mr. Walter Crum.

Laboratory Memoranda.—Mr. Brazier.

On the formation of Rosolate of Lime on Cotton fabrics in Hot Climates.—Mr. Crace Calvert.

On the Density of Alloys.—Mr. Crace Calvert.

On Stib-ethyl.—Mr. G. B. Buckton.

Report on the Chemical Characters of the Photographic Image.—Professor Maskelyne.

To exhibit a Photograph of Fluorescent Substances.—Dr. Gladstone.

To exhibit Two Photo-Chemical Experiments by M. Niepce de St. Victor; and a Collection of Photographs in Charcoal and Metallic Powder, and Photographic Enamels.—M. l'Abbé Moigno.

On a New Mode of generating illuminating Gas by means of Super-heated Steam and any Hydro-Carbon.—M. Isoard.

Composition of a recently-formed Rock on the Coast of Flanders. Communicated by M. l'Abbé Moigno.—Dr. Phipson, of Paris.

Composition of the Shell of Cardium Edule (Common Cockle).—Dr. Phipson, of Paris.

Preliminary Report on the Solubility of Salts.—Dr. Sullivan.

First Report on Mechanico-Chemical Analysis of Rocks.—Mr. A. Gages.

On Gold Nuggets from South Australia.—Professor Tennant.

On the Action of Air on Alkaline Arsenites.—Mr. J. M'Donnell.

On the Supply and Purification of Water.—Mr. T. Spencer.

On a New Mode of Bread-making.—Dr. Odling.

On the Composition of Thames Water.—Drs. Odling and Dupré.

Report on the Recent Progress and Present State of Organic Chemistry.—Mr. G. C. Foster.

Notice of Dugong Oil.—Communicated by Mr. Brazier.

On the Solubility of Bone-earth from various sources in solutions of Chloride of Ammonium and common Salt.—Mr. Binney.

Report on Field Experiments on the essential Manuring Constituents of Cultivated Crops.—Professor Voelcker.

On Soluble Silicates, and some of their applications.—Mr. F. Ransome.

Notes on the Current Methods for estimating Cellulose, or "Woody Fibre," in Vegetable Food-stuffs.—Mr. T. Segelcke.

On the Effects of different Manures on the Composition of the Mixed Herbage of Meadow Land.—Messrs. Lawes and Gilbert.

On the Organic Elements and their relations to each other and to the medium of light, illustrated by Models according to the Author's theory of the forms and structures of the Molecules of Bodies.—Dr. Macvicar.

On Crystallized Bi-chromate of Strontia.—Dr. Dalzell.

On the Economical preparation of pure Chromic Acid.—Dr. Dalzell.

On Corne and Demeaux's disinfecting and deodorizing Powd r.—M. l'Abbé Moigno.

On Matches without Phosphorus or Poison.—M. l'Abbé Moigno.

To exhibit a Nephogne, capable of being adapted to many chemical, therapeutic, and hygienic purposes.—M. l'Abbé Moigno.

On the Equivalent of Bromine.—Dr. Wallace.

On proposed Improvements in the Manufacture of Kelp.—Dr. Wallace.

Dr. Daubeny exhibited Specimens of several varieties of Volcano Tuff, from the neighbourhood of Rome and Naples.

Reports from the laboratory at Marburg.—Dr. Guthrie.

New process of etching glass in relief, by hydrofluoric acid. Communicated by Professor Wilson.—Mr. Napier.

On Combinations of Earthy Phosphates with Alkalies.—Professor Voelcker.

On Marsh's Test for Arsenic.—Dr. Odling.

Quantitative estimation of Tannin in some tanning materials.—Messrs. Mulligan and Dowling.

Mr. C. J. Burnett showed some Specimens illustrating the use of Platinum in Photography.

On the Sedimentary Nature of Granite.—M. Bialoblotzky.

The business of the Association was brought to a conclusion on Wednesday, the 21st, and on the following day a party of about two hundred Members, comprising the officers of all the sections, went by invitation of Her Majesty and the Prince Consort, to Balmoral Castle. The party arrived at the castle shortly before two o'clock, and witnessed some Highland games, at which Her Majesty, the Prince Consort, the Prince of Wales, and other members of the Royal Family, were present. A déjeûner was served for the Members of the Association in the ball-room of the castle; and at six o'clock the party started homeward, reaching Aberdeen about one o'clock in the morning. Unfortunately the weather proved unfavourable throughout the day.

The next meeting of the Association will be held at Oxford, under the presidency of Lord Wrottesley.

REMOVAL OF NUISANCES.—CHEMICAL WORKS, BOW COMMON.

On Friday and Saturday, October 14 and 15, Mr. Yardley was engaged at the Thames Police Court in hearing evidence on a summons against Mr. Alexander Angus Croll, of the Metropolitan Alum Works, Bow Common Lane, for an alleged nuisance, the summons stating that noxious gases injurious to health were evolved in and upon the premises of Mr. Croll, who was called upon to show cause why an order should not be made upon him to remove the nuisance and carry on his trade without injury to the health of the inhabitants of the neighbourhood. The prosecution was instituted by the Poplar Board of Works, and was conducted by Mr. Serjeant Thomas, instructed by Mr. W. H. Turner, solicitor. Mr. Child, solicitor, appeared for the defence. The case had been several times before the Court, and adjournments had taken place in order to enable Mr. Croll to carry on his operations in a less offensive manner. Various alterations and improvements suggested by the magistrate and several scientific men who made a visit to the premises in July last, had been carried out. The parochial authorities, however, contended that the nuisance still existed.

Mr. Yardley said the great difficulty was the escape of vapour from the tanks containing the ammoniacal liquor.

Mr. Serjeant Thomas contended that the state of things complained of had not been altered, and called upon the magistrate to order it to be done.

Mr. Yardley objected to make an order for the suppression of a business, or entirely close a large manufactory; if that were required, application must be made to a superior court.

Mr. Serjeant Thomas believed it was not difficult to get rid of the vapour; all that was required was a lofty chimney shaft, or that the sulphuretted hydrogen evolved in the process should be entirely consumed, and not allowed to pass into the air at all. It was contended by Mr. Child that all which could be reasonably expected had been done. A long discussion followed, Mr. Serjeant Thomas contending that the process as at present carried on was prejudicial to the health of the inhabitants, and a nuisance, Mr. Child arguing the contrary.

Mr. R. Warington, of Apothecaries' Hall, said he attended Mr. Croll's works on Oct. 11th, with Dr. Ancell. The ammoniacal liquor tanks were in operation, and gaseous matter was evolved, and there was a smell of sulphuretted hydrogen; he applied a piece of white test paper, which became brown. The vapour could be smelt thirty or forty yards from the tank shed, and also at the corner of the Bow Road, which vapour he considered dangerous both to health and comfort. He had suggested two things to get rid of the nuisance: either to burn the sulphuretted hydrogen, or absorb it; the most effectual plan would be to have a gasometer into which the vapour could be collected and burnt, or pass it into a chamber containing oxide of iron, and absorb it. In cross-examination by Mr. Child, witness said he would not undertake to say the offensive smell he experienced in the street came from Mr. Croll's works; there were other works in the neighbourhood from which sulphuretted hydrogen was evolved.

Mr. T. Ancell, medical officer of health for the Poplar district, and several other witnesses, confirmed Mr. Warington's evidence.

Mr. Child then called Dr. A. S. Taylor, Professor of Chemistry, for the defence.

Dr. Taylor said he went to the defendant's works, expecting to find a state of things different from that which actually existed, and the conclusion he came to was, that the sulphuretted hydrogen was not evolved in sufficient quantity to extend to the neighbourhood, and was not a nuisance. Dr. Odling and Dr. Murdoch followed on the same side, confirming Dr. Taylor's evidence.

Mr. Yardley, in summing up the case, said the question was narrowed to this—Was there a sufficient amount of sulphuretted hydrogen to injure health and be a nuisance? He did not consider that this was proved. He therefore refused to make the order, and dismissed the summons. Mr. Serjeant Thomas applied for costs, which were refused, on the ground that as no order had been made no costs could be ordered.

PROSECUTION UNDER THE NEW MEDICAL ACT.

Kingston Borough Bench.

(Before J. Williams, Esq., Mayor, J. King, T. Leonard, and E. H. Fricker, Esqrs.)

Mr. Frederick Gould, Chemist and Dentist of the Market Place, Kingston, appeared to answer to an information laid against him under the above Act, by Theodore Edward Ladd, Secretary to the London Medical Registration Society, for having, on the 5th of August last, at his residence in Eden Street, taken and used the title of surgeon without the legal qualification, he (F. Gould) not being registered under the Medical Act, and that he did, in that capacity, treat one Charlotte Tenniswood for a surgical complaint, and did supply her with medicine for the same, contrary to the statute, for which medicine he was paid, and for which offence he, the said Frederick Gould, had forfeited a sum of money not exceeding £20.

Mr. Gould, who conducted his own defence, pleaded Not Guilty to the indictment.

The prosecution was conducted by Theodore E. Ladd, M.D., who stated that he represented the London Medical Registration Society—a society formed for the purpose of suppressing illegal practice—and that it had been very successful in many cases, as in those of the Bennetts and of Nunn. The prosecution was taken under the New Medical Act, in clause 40 of which it is provided that if any person shall wilfully or falsely pretend to be, or take or use the name or title of surgeon, or various other medical titles, or any title, or any name, title, addition or description, implying that he is registered under this Act, or that he is recognized by law, as a surgeon, &c. &c., shall, upon summary conviction, pay a sum not exceeding £20. Dr. Ladd also stated that the Act had been for twelve months in operation, and, therefore, no plea of ignorance on the part of Mr. Gould could stand good; he, therefore, pleaded for the full penalty, considering that Mr. Gould's position had, no doubt, been attained by receiving fees which should have gone into the pockets of medical men.

Charlotte Tenniswood was then examined, and deposed that about the 5th of August last she hurt her elbow, and went to the shop of Mr. Frederick Gould, who examined her arm, and gave her a liniment to apply to the same, and told her to call again in a few days. Had noticed "Surgeon" outside the door, and should not have gone had she not believed him to be a surgeon. In cross-examination by Mr. Gould, witness said the reason she went to him was that "she thought she could get what she wanted cheaper at a chemist's than at a doctor's." Witness certainly saw "Surgeon and mechanical dentist," but she "separated the words, and believed him to be both surgeon and mechanical dentist." A witness, clerk and collector to the assistant secretary of the Association, was called, and proceeded to give evidence as to what he had seen at a chemist's at Wimbledon; but the magistrates decided that they had no jurisdiction with regard to what took place at Wimbledon.

John Cross Roope, clerk to the Medical Council, proved that the name of Frederick Gould was not upon the register. This closed the case for the prosecution.

Mr. Gould then commenced his defence. He said the case was a very important one, and the Society with which the prosecutor was connected was established for perfectly legitimate objects, and that he had himself endeavoured to promote a similar object for dentists. The object of the Medical Act was to protect the profession against quacks, and he felt himself highly complimented by being classed with the Bennetts and the Watters. The Act was to enable the profession to purge themselves, the chemists had obtained powers to do the same, and the dentists were seeking powers. He would direct attention to the 55th clause of this Medical Act. "Nothing in this Act contained shall extend to, or be construed to extend to prejudice, or in any way to affect the lawful occupation, trade, or business of chemists and druggists and dentists." Now he was charged with falsely and wilfully pretending to be a surgeon, implying that he was registered under the Act. He contended that it was perfectly lawful for chemists to prescribe medicine, and the Act stated that nothing therein contained should affect chemists. The Society represented by the prosecutor was not the Council established by Act of Parliament, but a trade association, the animus of which was evident, for, instead of going to him and telling him he was doing wrong, as the most stringent of all boards, that of the Inland Revenue, would have done, they sought to catch him in a legal trap. He was known by every one in Kingston to be a dentist and chemist, and nothing else. The term surgeon-dentist

had been in use for a long time, and words must not be separated. If a person were ill, he went to the man who had "Surgeon" on his door; a little further on he might see "Surgeon-dentist." Would any one pretend that these were the same things? He challenged the Society to try the question fairly. Dr. Ladd had been engaged in correspondence with the secretary of the Dental College on the subject, and it had been referred to the Medical Council to give an opinion as to whether dentists were entitled to use the name surgeon, but they declined to settle the point. The answer given to the proposal of the dentists by the Association was, that they would be prepared to try the question at a convenient time; but the College of Dentists, knowing that a convenient time was a long time in arriving, suggested arbitration, in order that a contest between two institutions—both established for public benefit—should be avoided. Dr. Ladd had laid great stress upon the fact that it was impossible he could be ignorant of the law, whereas he had never seen the Medical Act till after he had received the summons. For some time past he had been compelled from ill health to abstain from his usual course of reading, and as a chemist and dentist he never thought the Act had anything to do with him. It was known to every one that if you had diarrhœa, or some other slight ailment, and went to a chemist, he would look at your tongue or feel your arm, as in this case, and put you up something for it. This person went to a chemist because it was cheaper, or, as she corrected it, because she saw "Surgeon on the door-plate;" this she made out by separating the words. You might as well indite a man for selling ginger-beer, because he sold beer without a licence. There was nothing in the language which might not by the same process be made to mean something else. Did the court believe that he falsely and wilfully pretended to be a surgeon by putting up "Surgeon-dentist?" It was a compound term, in which the noun surgeon was used adjectively; just as we had "town-hall," "market-place," &c. Many of his customers told him that they were not aware that he supplied artificial teeth; he, therefore, had the words "Dentist-surgeon and mechanical" placed on his window; could any one separate these words and make him out to be a surgeon, a dentist, and a mechanical? It had been assumed by Dr. Ladd that he had wronged medical men; but it was a sufficient reply to this charge to state that he had received help from them to enable him to defend the case.

It was intimated to defendant that the bench wished him to address himself to the charge of prescribing, as they were satisfied on other points.

Mr. Gould.—The whole case depends on my motive in using the word surgeon.

The Town Clerk, in answer to an appeal, stated that there could be no mistake upon the point. The Act had reference only to those "wilfully and falsely pretending to be, and assuming the title of surgeon."

Mr. Gould then called a witness,

Mr. Kent, the district medical officer, to rebut the charge made by the informer—that he (Mr. Gould) had repeatedly prescribed in many other similar cases. Mr. Kent stated, that, although he had met with many cases which had been treated by chemists, he did not recollect one treated by Mr. Gould.

Dr. Ladd then proceeded to reply, but the Town Clerk stated that under the Medical Act there could be no reply on either side.

His Worship the Mayor then, after a short consultation, delivered the decision of the bench. They had, he said, paid every attention to the case, and had anxiously considered it. They did not believe there was any false and wilful intention on Mr. Gould's part to represent himself as a surgeon, and their unanimous decision was that the summons be dismissed, with costs.

Dr. Ladd then asked for a case for the Court of Queen's Bench.

POISONOUS COLOURED SWEETMEATS.

Considerable excitement has been caused within the last few days at Northtawton, a small town in the north of Devon, in consequence of the following occurrence:—Six children, belonging to different families, were seized with vomiting, and Dr. Budd, a physician, on being called in, stated that they had been poisoned. On inquiry, it was ascertained that they had eaten coloured sweetmeats called "birds'-nests," which were purchased in the fair of a man named Ryan, of Northtawton. All of that description were shortly afterwards seized by Mr. Super-

intendent Grant, of the county constabulary, who was informed by Ryan that he had purchased them of a confectioner of Exeter named Sherry. On the following day, Superintendent Grant obtained a warrant and took possession of a quantity of colouring matter found on the premises of Sherry, and handed it over to a chemist for analysis.—*Times*, Oct. 17.

DEATH FROM PRUSSIC ACID.

The Rev. Charles Thomas James, formerly curate of Ermington, and recently appointed Government Inspector of Model Lodging-houses and Factory Schools, was staying at the Railway Hotel, Taunton, on Tuesday night, October 4th, and intended to start next morning for Tiverton. He had been unwell for several days, and was suffering from indisposition when he retired to rest. The following morning, as he did not make his appearance, the servants entered his room and found him lying on the bed quite dead. An inquest was held before Mr. Monckton, coroner, when it was shown in evidence that the deceased took prussic acid under medical prescription. Several letters which the deceased had written on Tuesday night were read. One of them, addressed to his son, said that his indisposition almost mastered him, but appointed to meet his son at Plymouth on Thursday. The jury returned a verdict that the deceased died from the effects of an overdose of prussic acid, taken to relieve himself from pain.

CATTLE POISONED FROM EATING YEW BRANCHES.

At Red House, Hursley, lately occupied by Mr. Fowlie, bailiff to Sir W. Heathcote, Bart., there is a yew hedge cut to fancy shapes and figures. The operation of clipping it was performed recently, and the cuttings, which Mr. Fowlie during his occupation had always carefully collected and burnt at once, were on this occasion suffered to lie on the grass of the field. Alongside, in this field, Mr. Newton, of Ashley, had about thirty heifers to feed, and one morning some boys who were out picking mushrooms found eight of them lying dead at different places. A ninth was apparently in great pain, and a strong emetic given to it showed the cause of the death of the others—namely, the eating of the yew cuttings from the hedge.

REVIEW.

Chapman's Veterinarian's Pharmacopœia: *a Work of Reference for the Use of Veterinary Surgeons, Chemists, &c.* Compiled by George Chapman, 4, Elm Hill, Norwich. 1858.

This work has been advertised by bills sent to Chemists and others, in which it is stated that it is dedicated to the Chemists and Veterinary Surgeons of Great Britain, and that it was "completed by the author in the early part of the year 1858, after a long and laborious period, which has reaped its reward by a constant, increasing demand, extending to all parts of the world." A long list of testimonials in favour of the work is appended to the advertisement, and then follows the announcement, "Price 2*s.* 6*d.* each, post-free, or three copies for 5*s.*, which may be enclosed in penny postage stamps with the order, to prevent the necessity of entering small amounts." It appears that "orders are constantly received from abroad," as well as from the Chemists of Great Britain, to whom the work is dedicated; but as some of our readers may still be unacquainted with the character and merits of the work thus produced "after a long and laborious period," we may state that the copy before us is $4\frac{5}{8}$ inches long by $2\frac{7}{8}$ inches wide, and that it weighs exactly 160 grains. It consists of title-page, and thirty-seven pages of printed matter, of which the following may be taken as a specimen, being a copy of the first page. Twenty-four out of the thirty-seven pages are thus devoted to an enumeration of diseases, with reference by numbers to recipes at the end for the appropriate remedies. These recipes are eighty-seven in number, and occupy eleven pages of the book. Then there are two pages devoted to weights and measures, doses, &c., where we are told that sixteen ounces make a pint. The recipes appear to be of the ordinary description of those used by Veterinary Surgeons.

VETERINARIAN'S PHARMACOPŒIA.

ABBREVIATIONS:

H.—Horses. C.—Cattle. S.—Sheep.
Sw.—Swine. D.—Dogs.

DISEASES, &c.

Alterative Condition Balls—H, to restore a horse to health, clean the coat, cure grease, &c., or any skin disease (No. 1).

Alterative Powders—C (No. 61), Sw (No. 47), D (No. 53).

Antispasmodic (*vide* cordials for H, C, S, Sw, D).

Apoplexy and Sturdy (*vide* purges for Sheep).

Asthma—H (No. 5), C (No. 20), every night while necessary.

Astringents—H (No. 5), C (No. 18), D (No. 54).

TO CORRESPONDENTS.

PHYTOLOGICAL SOCIETY.—The meetings of this Society will commence for the season on Wednesday, the 9th instant, at 8 o'clock P.M.

CHEMICAL DISCUSSION ASSOCIATION.—The first meeting for the season will take place on Monday, the 7th instant, at 8.30 P.M.

B. (Plymouth).—(1.) *Liquor Cinchonæ*, when ordered in prescriptions, is understood to mean *Infusum Cinchonæ Spissatum* of the Pharmacopœia, and this, according to Phillips, is from twenty-four to thirty-six times as strong as the infusion. (2.) *Tinctura Ferri Ammonio-Chloridi.* It appears from a note in Phillips's translation of the Pharmacopœia that there was an error in the formula first published by the College, and the correction of this error by Mr. Phillips is the cause of the discrepancy referred to. (3.) The violet or pink colour sometimes observed in Liquor Sodæ Chlorinatæ, when made with carbonate of soda and chlorinated lime, appears to be due to the presence of a little permanganic acid, which the chlorinated lime often contains.

A Country Member (Shrewsbury) will find the subject he refers to treated of in this and previous numbers of this Journal.

T. P. B. on Charcoal.—The communication is not suited for publication.

M. P. S., per examination.—Sea water would not produce any beneficial effect in the case stated.

Scotus.—The difference in the atomic weights used in different works on chemistry has been repeatedly referred to and explained in this Journal. The numbers given in Fownes's Manual are those used at the School in Bloomsbury Square, excepting where these differ from the numbers implied by the nomenclature of the Pharmacopœia. Thus 100 is the number adopted in Fownes for mercury, but 200 is the number implied by the name bichloride of mercury, as given in the Pharmacopœia to corrosive sublimate.

J. T. Holmer, Manchester, is referred to the above. The fact that the atomic weight of mercury is sometimes given as 200 and sometimes as 202, arises from differences in the results of analyses made for the purpose of determining the atomic weight; 200 is considered the more correct of these numbers. The fact that sometimes 100 and sometimes 200 is given, arises from differences of opinion as to the constitution of compounds of mercury. Thus, if 100 be the atomic weight of mercury, corrosive sublimate will be chloride of mercury, but if it be a bichloride the atomic weight will be 200. These numbers all refer to hydrogen as one, and the hydrogen scale is that now generally adopted.

W. Girdler (Oxford).—Carbolic acid is one of the constituents of coal tar. It possesses characters and properties resembling kreasote.

E. W. (Brighton).—Copper was used for the sheathing of ships because, being acted upon by certain constituents of sea water, it prevented the attachment of marine animals and vegetables; but the copper was so much acted upon, especially in some seas, as to be soon destroyed. Sir Humphrey Davy suggested the use of pieces of zinc to be attached to the copper, which, by galvanic action, prevented the corrosion of the copper, but this was so completely effected that the copper lost its valuable property of keeping free from the accumulation of animal and vegetable matter. An alloy of copper and zinc (*Muntz metal*) is now used, by which the twofold object is accomplished.

A Registered Apprentice.—(1.) *Chloric ether.* A paper on the subject will appear in the next number of this Journal. (2.) *Acidum Nitro-muriaticum dilutum* is usually made by mixing the diluted nitric and muriatic acids. There is no authorized form.

T. E. O.—We have not seen the notice referred to, but doubt the possibility of obtaining such delicate indications in the way described.

F. H. B.—We cannot account for the result stated, but presume it must arise from impurities in the wax.

Chapman's *Veterinarian's Pharmacopœia.*—We have received several letters from parties who complain that they have been induced by the representations contained in bills which have been circulated through the trade, to send postage stamps for this work, and when received have found it to be a very different work from what they expected.

A Member (Reading).—*Pulvis Bismuthi Compositum* (Startin):—

℞ Bismuthi Trisnitratis, ℥iss.
Plumbi Chromati, ℈j.
Carminii, gr. x.
Hydrargyri Bisulphureti, gr. x.

Misce.—*Pharmacopœia of the London Hospital for Diseases of the Skin*, 1858. There is no published formula for "*Pulvis Bismuthi Compositus*, No. 2."

U. (Bradford).—"Petroline" is a product of the distillation of coal tar, similar to "paraffine."

E. S. N. (Paddington).—(1.) We have no means of judging of Canada as an advantageous opening for a Chemist. (2.) We believe that no examination would be required.

Chemicus (Manchester).—See page 288.

R. H. (Cheltenham.)—*Cod Liver Oil and Iodide of Iron.* See vol. xvii., page 36.

W. L. P. (Guernsey).—Cooley's *Practical Receipts.*

Chemicus. (Stafford.)—We can only recommend our correspondent to get a Greek grammar.

D. G. N. (Aylsham).—*Marking Ink.* Vol. vi., page 419, and vol. vii., page 183.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. VI.—DECEMBER 1st, 1859.

THE EDUCATION OF THE PHARMACEUTICAL CHEMIST.

In the address delivered by Dr. George Wilson, at a meeting of the Pharmaceutical Society in Edinburgh, a report of which is given in another part of this journal, some questions of considerable importance, relating to the education of the Pharmaceutical Chemist, are discussed. This address will be read with much interest, coming as it does from so high an authority, and containing suggestions which, although they may elicit some differences of opinion, are well worthy of mature consideration. We must confess that, while agreeing with Professor Wilson in much that he has said, and considering many of his remarks as very valuable, and calculated to draw attention to defects in the mode of training pupils hitherto generally adopted, we differ from him on some important points, and especially with reference to the subjects which ought to be included in the curriculum of education assigned to the Pharmaceutical Student.

Dr. Wilson considers that the *minimum* curriculum of Pharmaceutical study should comprise—

"1st. A thorough familiarity with the appearance and sensible properties, such as odour, colour, taste, and the like, of every important drug or medicine, natural or artificial, whether derived directly or indirectly from the mineral, vegetable, or animal kingdom.

"2nd. A knowledge, the greater the better, of the chemical nature or composition of all the important drugs or medicines.

"3rd. A general acquaintance with the physiological action or influence on the living body of the chief medicines in use."

He says, "I have no hesitation in saying that a Pharmacologist, able to afford himself an additional pure scientific class, would act more wisely in selecting Physiology than Botany, although the latter is generally supposed to be much closer to Pharmacy than the former. Botany assuredly is a delightful study, and as it can be prosecuted in Edinburgh, affords a most welcome relief to all who can escape from the bondage of a laboratory. But in its direct bearing on the Pharmaceutical profession, it cannot compare with Physiology, and in a minimum curriculum the latter must have precedence."

We think the opinion thus expressed is erroneous, or, at any rate, that the mode of expressing it is calculated to produce an erroneous impression. The knowledge comprised under Dr. Wilson's first head would, we presume, include the natural history of drugs, with all their physical characters and properties. Now, if a *thorough* acquaintance with these is required, if the Pharmaceutist is expected to be able to identify all the different vegetable substances that are used in medicine, and to detect the substitution of one for another, where the differences are but slight, and perhaps inappreciable to the uneducated eye, it will be found that a general acquaintance with the science of Botany will form the true and only certain foundation for such a qualification. A knowledge of Botany is in fact as much required for the identification of the vegetable, as is a knowledge of Chemistry for that of the mineral Materia Medica.

We perfectly agree with Dr. Wilson that a *thorough* familiarity with the means of identifying all drugs, and of distinguishing the genuine from the false, the good from the bad, by reference to their physical and chemical characters

and properties, is the first and most important requisite in the qualification of the educated Pharmaceutist; but we cannot exclude the study of Botany any more than that of Chemistry from the curriculum of education which is to form even the minimum of this qualification.

The importance to the Pharmaceutist of a *general* acquaintance with the physiological action or influence on the living body of the chief medicines in use is unquestionable, and such acquaintance is usually acquired from the study of Materia Medica, even as this subject is taught in classes designed for Pharmaceutical students; but anything more than such a general acquaintance, so far from being beneficial, would be absolutely injurious, in its "bearing on the Pharmaceutical profession." Irrespective of this bearing we do not mean to deny that the study of physiology and of the physiological action of medicines may be of use, but if these are to form distinct branches of study in the Pharmaceutical curriculum, how will it be possible to keep the Pharmaceutical profession separate from medical practice? We think Dr. Wilson has over-estimated the importance of physiology and the physiological action of medicines, and has under-estimated the value of Botany, as branches of study designed for the professional qualification of the Pharmaceutical Chemist.

It behoves the Members of the Pharmaceutical Society to be very careful to avoid everything that could be construed into a disposition to encroach upon the legitimate and exclusive province of the medical practitioner. Let us not follow in the footsteps of the Irish Apothecaries. We have a clearly defined sphere of action, and by limiting the qualification of our Members, as recognized by the Society, to those subjects which will render them most efficient in the performance of the duties comprised within this sphere, and least disposed to meddle with other men's business, we shall best consult the interests of the profession to which we belong, and of the general public.

Having to this extent found it necessary to dissent from what appears to be the tendency of some of the Professor's remarks, we are glad to be able to turn to another part of the address, with which we most fully coincide in opinion. We refer to what is said on the subject of the preliminary education or school learning of Pharmaceutical apprentices. That this is often very imperfect and insufficient to form the basis of a sound scientific education there can be no doubt, and pupils often experience great difficulties in successfully prosecuting their scientific studies on that account. The first, or classical examination of the Society was intended to remedy this evil by indicating to those who contemplated becoming students of Pharmacy that a certain amount of classical and other school learning is requisite to enable them to take the position of qualified Pharmaceutists. A change for the better has already taken place in this respect, which may, no doubt, be referred to the influence of the Society's educational arrangements, but there is still room for improvement, and we trust the very judicious remarks of Dr. Wilson will draw further attention to the subject.

The remarks made on the shortening of the hours of labour will meet with a favourable response from many, while the introduction of the subject may be regretted by others. All will agree in desiring that the day's work should be confined within reasonable limits, but some difference of opinion exists as to the limits that may be considered reasonable, and as to the practicability of fixing such limits, in all cases, in reference to Pharmaceutical work. Improvement in this direction can only be effected to any appreciable extent by the co-operation of the public and of the medical attendants of the sick. The difficulty of effecting a change to the extent sought for, may be inferred from the extraordinary nature of the proposition made by Dr. Wilson for its accomplishment.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *2nd November*, 1859,

Present—Messrs. Bird, Bottle, Bucklee, Cupiss, Davenport, Deane, George Edwards, Hanbury, Haselden, Herring, Lescher, Macfarlan, Meggeson, Morson, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

CAPE TOWN.....Mathew, John Alfred
FAIRFIELD .....Mercer, Nicholas
GENEVA .....Baker, George, S.
HENLEY-ON-THAMES .....Edman, Bonner
STOWMARKET .....Cornell, William
TOTTENHAM.....Allen, James Hore
UXBRIDGE .....Rayner, John Charles

MINOR EXAMINATION, 15*th November*.

Delves, George.....Tunbridge Wells
Harvey, Sidney .....London

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Amoore, Alfred S.	Messrs. Randall & Son	Southampton
Benson, J. Levett	Mr. Dalwood	Sherborne
Evans, John James	Messrs. Evans, Lescher, & Evans	60, Bartholomew Close
Metcalfe, Charles J.	Mr. Maitland	8, Torrington Pl., Torrington [Square
Miller, Thomas H.	Mr. Jackson	Crediton
Rastrick, Robert J.	Mr. Rastrick	Southsea

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued*).

	£	*s.*	*d.*
Amount previously advertised, £1422 12*s.* 6*d.*			
Adams, William, F.R.C.S., 5, Henrietta St., Cavendish Sq.	1	1	0
Allchin, Alfred, 32, Coles Terrace, Islington	2	2	0
Allen, William, 2, Morgan's Place, Islington	1	1	0
Anderson, Charles, 23, Lower Belgrave Street	1	1	0
Andrew, Leyshon, Swansea	1	1	0
Ball, Thomas M., 77, St. George's Road, Southwark	1	1	0
Barker, Matthew Mark, Masham	1	1	0
Brelsford, Mark, Oldham	1	1	0
Brend, Thomas, Swansea	1	1	0
Buckle, Christopher F., Gray's Inn Road	1	1	0
Butler, Samuel, Bristol	2	0	0
Carr, John, 171, High Holborn	1	1	0
Corbyn, Messer, Stacey, and Co., 300, High Holborn	5	5	0
Corfield, Thomas, J. T., St. Day	0	10	6
Cursham, George, M.D., 55, Victoria Street, Westminster	1	1	0
Dudgeon, George, Nottingham	0	10	0
Edwards, George, Dartford	2	2	0
Field, William, 27, Queen's Buildings, Brompton	2	0	0
Gale, Henry, 3, Millbrook Place, Camden Town	2	2	0
Glaisyer and Kemp, Brighton	10	10	0
Glover, W. T., Swansea	0	10	6
Griffiths, William, Swansea	0	10	6
Groves, Wellington E., Blandford	2	2	0

	£	s.	d.
Gutch, J. W. G., M.R.S.C.L., 55, Upper Charlotte Street	1	1	0
Harris, James, Swansea	0	10	6
Hayward, Charles John, Lincoln	1	1	0
Hills, Edward Henry, M.R.C.S.L., Richmond	3	3	0
Jackson, William, Crediton	1	1	0
Jull, Thomas, Horsham	1	1	0
Keall, Powell Skinner, Bristol	1	1	0
Kitching, Joseph, 234, Blackfriars Road	0	5	0
Lasham, John, Dedham	0	10	0
Leggett, John T., Wareham	1	1	0
Maitland, John, 10, Chester Place, Hyde Park	2	2	0
Marshall, James A., Waltham Abbey	1	1	0
Merrell, James, 1, Queen's Terrace, Camden Villas	1	1	0
Morton, George, Stratford-le-Bow	1	1	0
Mumford, George, 5, Bathurst Street, Hyde Park	2	2	0
Penrose, Arthur Wellesley, 7, Amwell Street, Clerkenwell	1	1	0
Rayner, William, Sheerness	1	1	0
Rolfe, William A., Bath	0	10	6
Rouse, Benjamin R. C., 9, Wellington Street, Southwark	1	1	0
Sharwood, James Allan, 98, Fenchurch Street	5	5	0
Shum, Henry, Swansea	1	1	0
Smith, William, Brighton	1	1	0
Sowerby, John, Carlisle	1	1	0
Thomas, Richard W., 10, Pall Mall	5	5	0
Tomes, John, F.R.S., 37, Cavendish Square	1	1	0
Wilkes, George, 1, Hayfield Place, Mile End	0	5	0

Page 254, *for* Fusson, *read* Fresson, William.

PHARMACEUTICAL MEETING.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

Wednesday, November 2nd, 1859.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

An Enumeration of Ceylon Plants. By G. H. K. Thwaites. Part II. From the Author.

The Tenth Annual Report of the Liverpool Chemists' Association. From the Association.

Journal of the Society of Arts. From the Society.

Photographic Journal. From the Photographic Society.

The Dentist. From the Publisher.

The *Pun-tsaou-kang-mŭh*, a Chinese work on Materia Medica, in 40 volumes. By Li-shi-chin. From the executors of the late Mr. Jacob Bell.

A specimen of Kokum Butter, or Concrete Oil of Mangosteen. From Mr. Squire.

Berries of *Celtis australis*, *Radix Selini palustris*, Galls of *Pistacia Terebinthus*. From Mr. D. Hanbury.

Specimens of *Dika Bread*, and an undescribed *Bark* from the West Coast of Africa. From Mr. Simmonds.

PRIZE HERBARIUM OF BRITISH PLANTS FOR 1859.

At the desire of the President, Professor Bentley announced to the meeting the result o fthe compctition for the above prize during thc past year. Mr. Bentley said that it was much to be regrettcd that on the present occasion there was only one collection of plants forwarded for competition, but this one was so

excellent in every respect that he had no hesitation in at once recommending to the Council the award to it of the highest prize—namely, the silver medal; and he was pleased to find that the Council had agreed with him as to the great merit due to the collector, and had carried out his recommendation. He should only add that the collection contained 551 specimens, and most cordially congratulated the collector on his success. Mr. Bentley then announced that Mr. Henry Pratt, Registered Apprentice of the Pharmaceutical Society, and pupil of Mr. C. F. Loggin, Pharmaceutical Chemist, of Stratford-on-Avon, was the successful candidate.

The PRESIDENT then presented the Council Silver Medal to Mr. Pratt, and, in doing so, congratulated him upon his deserved success on this occasion, and trusted that it would serve as an additional stimulus to him in the further prosecution of his studies.

THE ANALYSIS AND PREPARATION OF GRANULAR CITRATE OF MAGNESIA.

BY HARRY N. DRAPER, F.C.S.

A PREPARATION purporting to be citrate of magnesia, which at the same time that it is in the form of small white granules is also effervescent, has been recently introduced, and as a matter of course its *modus faciendi* has been the cause of much ingenious speculation. The difficulty which assails one at the outset is this:—Each individual granule gives off carbonic acid when brought into contact with water, therefore an acid and an alkaline carbonate must co-exist in that granule. How were these two united without chemical union?

To answer this question, and thus unveil the secret of the granular citrates, the investigation which I am about to detail was undertaken. It was at every stage especially interesting; chemically, as showing the composition of a very elegant preparation, and mechanically, as illustrating an entirely novel method of granular division.

The sample for analysis was taken from a four-ounce bottle, such as is sold for a shilling; directions for the use of the preparation were upon the label, but I am quite unaware of the name of the maker. The granula contained in the bottle were not of uniform size, the largest occupying the top, while lower down they even degenerated into a coarse powder. They were perfectly soluble in water, and the solution when boiled to expel carbonic acid was neutral to test paper. When a quantity of the granula were together, as in the bottle, a faint citrine, approaching somewhat to terebinthinate, odour was perceptible. The taste of the solution was saline and slightly bitter.

A careful qualitative examination showed the presence of the following substances:—

BASES.	ACIDS.
Soda	Sulphuric
Magnesia	Tartaric
	Carbonic

The absence of citric acid and of every other alkaline or earthy base beside soda and magnesia was also established. A quantitative analysis gave the following numbers:—

Soda	16.68
Magnesia	1.50
Tartaric acid	40.00
Sulphuric acid.....	3.03
Carbonic acid	14.40
Water	24.39
	100.00

The magnesia was precipitated from the solution by phosphate of ammonia, and weighed as pyrophosphate. From the filtrate the excess of phosphoric acid was removed by adding a solution of acetate of lead; the lead was next precipitated by a current of sulphide of hydrogen, the solution evaporated to dryness with hydrochloric acid, and the remaining chloride ignited and weighed. From this weighing the amount of soda was calculated.

The carbonic acid was estimated by the method of Fresenius and Will, the sulphuric acid as sulphate of baryta, the water by exposing the powdered granula to a temperature of 212° until they ceased to lose weight, and the tartaric acid as the quantity required to form a neutral tartrate with the quantity of soda found present.

The "Citrate of Magnesia" is, therefore, such only in name, seeing that in the first place it contains no citric acid, and secondly, only one and a half per cent. of magnesia enters into its composition. The so-called citrate is really a mixture of sulphate of magnesia with tartaric acid and bicarbonate of soda. Its composition deduced from the above numbers may be thus stated—

Bicarbonate of soda	27.49
Tartrate of soda	20.46
Tartaric acid	24.18
Sulphate of magnesia	4.54
Water	23.33
	100.00

This composition is just what might have been expected, for the fact that the neutral citrate of magnesia is insoluble, and that the mixture of citric acid with the alkaline carbonates would only produce a soft pasty mass, which could not possibly be dried without undergoing complete decomposition, precludes the introduction of citric acid as any large proportion of the compound.

I was led to the discovery of the method by which the granula might be—and in all probability are—formed, by a careful study of their physical character, by their chemical constitution, and by the peculiar terebinthinate odour before alluded to. This last, I conceived, could only be produced by the exposure of the oil of lemon, with which the substance had been flavoured, to heat. The idea of its being produced by unaided oxidation was precluded by the fact that the mixture being deliquescent would be decomposed by continued exposure to air.

If tartaric acid and bicarbonate of soda be mixed in equivalent proportions, and heated in a water-bath, the mixture dries with little, if any, evolution of carbonic acid. But if after being mixed the powder is either slightly moistened with water, or exposed to moist air until it becomes adherent and that it is then heated, a considerable quantity of this gas is evolved, which forces the particles of the mass apart, as in the fermentation of dough, giving it a spongy character. If the heat be now continued the particles contract, and, provided that they be constantly kept in motion by stirring, form granula, which when dry permanently retain their form.

There are two points essential to a successful result. The first is to so regulate the moisture of the mass as to cause the least amount of decomposition, and at the same time obtain the entire quantity in the granular form. The second point to be attended to is the rapid heating of the whole quantity at a temperature not above 212°; for if the heat be slowly applied the mass dries and retains its pulverulent character. Thus it is easy to obtain perfect granula which shall not be effervescent, and *vice versâ*, imperfect granulation with a maximum of effervescence. It will be noticed in the analysis above given that a considerable quantity of the soda present is in the form, not of bicarbonate but of tartrate, showing the extent to which decomposition had taken place, and this was one of the most valuable indications which led me to the theory of the formation of this substance.

I have found that it is much better, instead of moistening the tartaric acid

and soda, to introduce a substance which shall produce with soda a deliquescent salt. Citric acid is that which I have found most successful. If this acid were altogether employed the mass would, as I have before noticed, become so soft as to be unmanageable, but by a judicious adjustment of the proportions perfect granulation is effected with the least possible decomposition.

I have found that by adopting the following formula, granula may be produced, which possess all the characters of the proprietary preparation, effervesce briskly, and are but very slightly deliquescent:—

Bicarbonate of soda	12 ounces
*Tartaric acid	10 ounces
Crystallized sulphate of magnesia	2 ounces 3 drachms
Citric acid	5 drachms
Oil of lemon	10 drops

Rub the citric acid and the sulphate of magnesia to powder together, then add the tartaric acid and bicarbonate, and mix intimately by sifting. Have ready a capsule—preferably of polished copper—set in a water-bath, and so arranged that the water vapour shall not come in contact with its contents, and when it has become heated, introduce the mixture into it. After the lapse of a few minutes the mass will be observed to separate, as has been already described, and it should then be rapidly stirred with a glass or bone spatula, until the granula are completely formed. It is then only necessary to keep them from adhering to the sides and bottom of the capsule during the time occupied in drying. Finally, the oil of lemon is added. The operation may be judged to be complete when the granula are perfectly white and do not feel soft upon pressure under the spatula. It is then only necessary to separate such as are too small or too large from those of the proper size, by means of two sieves, the "waste" being powdered and introduced with a new proportion of citric acid (which must, of course, be used in conjunction with an equivalent of bicarbonate of soda) into the quantity for a fresh operation.

The process, as above described, needs only ordinary attention to produce a perfectly successful result, but a single trial will show what are the arrangements best suited to each individual operator, far better than any written explanation. In conclusion, I may remark that the granulation of effervescent preparations seems to present many advantages, particularly as regards their preservation, which has hitherto been so difficult as to have prevented their extensive use.

Dublin, October 13th, 1859.

Mr. Davenport thought the paper which had just been read was calculated to produce the impression that the effervescing salt sold under the name of granular citrate of magnesia, and which was known by that name to most of the Members present, had the composition represented by Mr. Draper's analysis, whereas it was very evident that the sample which had been examined by Mr. Draper was a spurious imitation of what was generally sold in this country. He knew the gentleman (Mr. Bishop) by whom, he believed, it was first introduced, and the preparation made by him was very different from that which had been described. He thought it unfair to the man who, by an ingenious application of his knowledge, had devised a new mode of preparing an elegant and efficient medicine, that an indirect attack should be made upon his preparation by the publication of a statement which, while it was only really applicable to a spurious article, appeared to comprise in the description given all the preparations of the same name.

Dr. Redwood was not quite sure that the term, spurious imitation, could be correctly applied to the salt which had been analysed by Mr. Draper. The only imputation implied in Mr. Draper's paper had reference to the use of a name which did not correctly designate the substance; and he believed that all

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* If the preparation be required acidulous a larger quantity of acid must be used.

the preparations sold under the name of granular citrate of magnesia were to some extent subject to this imputation.

Mr. Hills stated that the so-called citrate of magnesia was brought to him, and finding it to be an elegant preparation, and a mild effervescing aperient, he had it examined; and as it was found to contain a large proportion of carbonate of soda, he altered the name to sodio-citrate of magnesia. The manufacturer (Mr. Bishop) being present, he hoped he would give some information on the subject.

Mr. Squire hoped that in publishing Mr. Draper's paper some explanation would be given, so as to prevent the infliction of an injury upon those makers whose preparations differed from that which had been analyzed.

Dr. Redwood said, if any maker felt that the description given by Mr. Draper did not apply to his preparation, he could state so; and his statement, if made on that occasion, would be published with Mr. Draper's paper.

Mr. Bishop said he had made large quantities of the granular salt to which reference had been made, and he found it give very general satisfaction. Mr Draper's description evidently did not refer to his preparation, the composition of which differed from that represented by the analysis.

Mr. Waugh was sorry it had not been more clearly indicated whose preparation it was that was analyzed by Mr. Draper. He thought, also, that they ought not to be too severe in condemning the use of a name that might not be strictly applicable. They were all guilty to some extent of selling articles the names of which were liable to exception, such as "Seidlitz Powders."

The Chairman thought it very desirable to avoid, as far as possible, in the papers published by the Society, interfering with the class of preparations to which the salt in question belonged, so long as they were free from objection. It was not their object to search into and make known the processes by which any of their brethren were enabled, by the legitimate application of their knowledge, to give some new form or character to a preparation, from which, for a time, they may derive advantage. Most of their Members had processes which they wished to keep to themselves, and there were also many preparations sold by Druggists under names which did not correctly designate their composition, such as "Lemon and Kali," "Salt of Lemon," &c. Strictly speaking, no doubt, such names were objectionable; but some latitude might perhaps be allowed where no obvious attempt was made to deceive the public. He had not examined the (so-called) granular citrate of magnesia, and therefore could not say how far that usually met with in commerce justified the application of that name to it; but no one, he presumed, supposed that it consisted merely of citrate of magnesia.

ON THE MISCIBILITY OF CHLOROFORM AND THE SO-CALLED CHLORIC ETHER WITH WATER AND OTHER LIQUIDS.

BY MR. F. A. HASELDEN.

I am induced to offer some remarks upon this subject for several reasons—namely, the frequent inquiries as to the proportion in which chloroform and spirit should be used in preparing chloric ether, the various strengths I have seen and heard given, varying from one of chloroform and four of spirit to one of chloroform and ten or twelve of spirit—and indeed I lately saw a specimen of chloric ether, purchased in Rome, of which, judging by the taste and smell, I should say the proportion of chloroform was about one in fifty of spirit. The reason for this great dilution is, I think, obvious—to wit, that there should be no separation of chloroform on mixing with water and other liquids, which, to the evident discomfort of some dispensers, is the case with the stronger preparations. Hence, in the paper before me, my object has been, in the first place, to arrive at some satisfactory result as to the exact proportions of chloroform and spirit miscible with water and other liquids in the ordinary way without any separation of chloroform; in the second, the relative proportions in which

chloroform and water are miscible, either with or without the addition of spirit; in the third, whether or no other liquids likely to be prescribed would retard or accelerate its miscibility; in the fourth, the proportion of chloroform and spirit miscible with liquids without any cloudiness whatever; in the fifth place, whether there would be any advantage derived from distilling the spirit and chloroform together over the simple mixing of them; and in the sixth and last, the best and most convenient proportion on all points for preparing the chloric ether.

1st. To find the proportion of chloroform and spirit miscible without deposit, I commenced with one part of chloroform and four of spirit, and gradually increased the quantity of spirit, by five minims at a time, until I reached the proportion of one part of chloroform and seven of spirit, when, and not before, I had obtained a preparation miscible at once, with cloudiness which soon disappears, with water and analogous liquids, without any separation or deposit of chloroform.

2nd. To find the extent to which chloroform and chloric ether are miscible with water, I took 10 minims of chloroform and 70 of spirit, and mixed with several proportions of water from one ounce to four, and it was only upon arriving at four ounces that I found my solution free from a deposit of chloroform. And I would here observe that I obtained precisely the same result by shaking the chloroform with the water without any spirit whatever; but to effect this some considerable agitation was necessary, adding the chloroform to a small portion of the water, shaking briskly for a minute, then adding more water and agitating again, and so on until all the water is added, when the union will be complete, the solution bright, and no subsequent deposit will occur.

In the third place, to ascertain whether the miscibility of chloric ether was increased or retarded by the addition of other substances to the solution, I mixed the chloric ether with solutions of camphor, bicarbonate of soda and potash, sesquicarbonate and benzoate of ammonia, the iodide and bromide of potassium, without any increase or diminution of the quantity of chloroform held in solution. With the tinctures generally, aromatic spirit of ammonia, and spirit of nitre, it unites readily without any alteration of the usual appearance; with the dilute sulphuric, hydrochloric, nitric, and phosphoric acids it mixes readily, even when the chloroform is in a less diluted condition than one part to seven—but yet, notwithstanding, I could not get more than ten minims of chloroform into four ounces. Glycerine appeared at first to enable me to increase the quantity of chloroform, but it was afterwards deposited, and a similar result occurred with mucilage of gum arabic when diluted, and when not diluted it deposited a waxy-looking substance.

In the fourth place, I was obliged to dilute the chloroform with thirty-nine parts of spirit to obtain a preparation miscible in any and every proportion and manner with water and similar liquids.

In the fifth place, having distilled the chloroform and spirit together, in the proportion of one part of chloroform and seven of spirit, I found that this distilled product possessed no advantage over the ordinary preparation, it not being in any way more miscible or tractable.

In the sixth and last place, I am of opinion that one part of chloroform and nine of spirit would, perhaps, as a matter of calculation, as we use the imperial or twenty-ounce pint in measuring, be the most convenient proportion; and I consider it very desirable that a definite strength should, as soon as possible, be decided upon in a medicine which is prescribed every day, and almost every hour.

The summary of the foregoing remarks appears to be as follows:—That chloroform is miscible with water, in any proportion not exceeding ten minims in four ounces, either by the addition of rectified spirit or by brisk agitation; that the employment of spirit is more convenient for general purposes; that no advantage is gained by the process of distillation; and though the proportion of one of chloroform and seven of spirit be a miscible proportion, it is possible, for

the sake of uniformity with other diluted preparations of the Pharmacopœia, that one part in ten would be preferable.

18, *Conduit Street*, *Oct.* 19*th*, 1859.

Mr. Whipple wished to know why the name chloric ether was used to designate a spirituous solution of chloroform? He was an advocate for the use of proper names, and thought the name chloric ether applied to a liquid having a specific gravity about 1.2, which had been described in chemical works. Spirit of chloroform was quite a different thing.

Dr. Redwood said the name chloric ether had been used for many years to designate a liquid, the composition of which was not at first well understood, but was now known to be a solution of chloroform in spirit. The name was, no doubt, a very incorrect one, and if the preparation should be introduced into the Pharmacopœia it would probably receive a more appropriate name.

Mr. Squire said the name spirit of chloroform had been suggested for the liquid under notice, but at present it was known only by the name of chloric ether.

ON PILULÆ.

BY MR. C. R. C. TICHBORNE.

Often is the compounder placed in a dilemma when a mass, intended to be formed into globular pills, is found to be in such a state as to preclude the possibility of ever accomplishing his object. In some cases the mass is never in a proper condition for rolling into pills that will retain their shape, viz., *Pilulæ Aloes compositæ;* thus frustrated in his endeavours, he consoles himself with abusing those occasionally much maligned works, which lately have met with their full amount of criticism, but as *parturient montes* are now so very numerous, let us hope that we may have an efficient result.

The pill masses of the Pharmacopœia consist of medicaments in the forms of extracts, powders, and volatile oils, mixed with certain substances to give them due consistence; these vehicles, viz., conserve of roses, soap, treacle, spirits of wine, and castor oil, are generally inert, but in some few cases have therapeutical effects, *e. g.*, the soap in some degree in many of the formulæ, or the castor oil in *Pilulæ Calomelanos compositæ*, D. Ph.; conserve of roses (which seems the favourite excipient in the Edinburgh formulæ), although an excellent vehicle, is not applicable when the proportion of dry ingredients is large. Treacle and soap are the substances selected by the other colleges—the London one directing an olive oil soft soap to be used, which, unfortunately, is not to be met with in commerce—the hard soda one, in use in other colleges, is excellent, and combined with treacle answers almost all purposes, but requires some management to get an even and perfectly homogeneous mass. The Ed. Ph. gives no directions except to mix the ingredients and beat them into a proper mass (with *Pilula Rhei composita*), which is rather a laborious and troublesome process, especially if the quantity operated on be considerable. The D. Ph. generally recommends the soap to be reduced to a fine powder first, but as it is required to be very dry before this can be done, it is not so facile in execution as some processes I am about to mention. One of them is to add sufficient water to the ingredients to render them pasty, and then to evaporate by a water or steam bath to a proper consistency, keeping the volatile oils, if any enter into its composition, until the close of the operation. The result is excellent as regards uniformity, but the process is not calculated to economize time. The plan I have adopted for some time, in all cases where both articles are introduced, is to dissolve the soap—cut small—in the treacle, by the aid of heat; this is done in a very short space of time, care being taken not to burn them; when the soap is dissolved it is passed through muslin, if necessary, and when sufficiently cool the powders and oil are rubbed or kneaded in; the whole manipulation is done very quickly, and the result is perfect.

I tried some experiments with the view of introducing glycerine into the composition of pill masses, thinking that it would be a valuable adjunct in the lapidification cases. My results, at first, were not of the most encouraging kind, from the circumstance of the glycerine having an inclination to separate and ooze from the mass, appearing upon the surface in small tears; but I found that when resinous powders entered into the composition of the pill, this tendency was completely remedied by the addition of a small quantity of spirits of wine; *e. g.*—

PILULA CAMBOGIÆ COMPOSITA.

Powdered Gamboge, ʒviij.
„ Socotrine Aloes, ʒiv.
„ Ginger, ʒiiiss.
„ Cardamom Seeds, ʒi.
Distilled Glycerine, f ʒiiss.
Spirits of Wine, f ʒi.

Mix the glycerine and spirits of wine together, and then incorporate the powders. The resulting mass will retain its shape when rolled, and yet remain soft for an indefinite period if kept in a covered jar. This excipient mixture is peculiarly applicable to the proto-ferruginous formulæ.

PILULA FERRI COMPOSITA.

Powdered Myrrh, ʒi.
Dried Sulphate of Iron, ʒss.
Dried Carbonate of Soda, ʒss.
Distilled Glycerine, f ʒiss.
Spirits of Wine, f ʒiss.

Rub the sulphate of iron and carbonate of soda well together in a mortar, add the myrrh, and continue the rubbing for a few seconds, then incorporate the glycerine and spirits of wine previously mixed. This pill will, I believe, keep in its pristine condition for any reasonable length of time. I have some in my possession made above a month, and it does not at present exhibit the least change. As the sulphate of iron on drying pertinaciously retains one equivalent of water, twenty grains of the pill, when dissolved by the fluids of the stomach, presents, or produces, about $2\frac{3}{4}$ grains of carbonate of iron. The *ferri sulphas siccatum* of the Pharmacopœia will answer all purposes; but a finer substance may be made by the following process:—Recently prepared sulphate of iron finely powdered is introduced into a Florence flask with seven or eight times its weight of strong spirits of wine; the flask is now closed with a cork, through which proceeds a tube of some considerable length. This contrivance, acting as a condenser, prevents a loss of the spirits from evaporation; heat is now applied until the spirit boils, the contents of the flask being kept in a state of rapid rotation to prevent the salt from aggregating, or fusing in its own water of crystallization. If this takes place, it is necessary to pour off the spirit and to rub down the salt to a pulp in a mortar; after a few minutes' ebullition it is sufficiently dehydrated to render the agitation superfluous; the flask is then placed in a water-bath, and kept boiling four or five hours. The supernatent spirit is then decanted off and the salt thrown upon a paper filter; after draining two or three minutes it is dried at 212° F. As the spirit poured off contains but a trace of iron, it is applicable for most purposes, so that the loss in this method is not worth consideration, especially if methylated alcohol is at hand. The glycerine is capable of extensive application for pill masses; but from want of time I have not been able to prosecute the inquiry further. *Pilulæ calomelanos compositæ*, *pilulæ aloes et ferri*, *pilulæ ferri iodidi*, and some others are cases in which it could be used with great advantage.

In constructing formulæ too much attention cannot be devoted to economy, so that by circumscribing the ingress of costly and rare ingredients as much as possible, less temptation may be thrown in the way of the unscrupulous and mercenary.

The *pilulæ*, from the difficulty in detecting their quality from ocular examination, are peculiarly open to sophistication in the hands of the short-sighted £ *s.* and *d.* men.

As a friend of great commercial experience justly remarked when conversing with the writer upon this subject, "The framers of the formulæ are unfortunately scientific men, who having but limited knowledge of the market value of the articles, introduce many costly substances, such as saffron, &c., which, without adding to, or affecting the therapeutical results, merely contribute to the expense."

Laboratory, Apothecaries' Hall of Ireland.

DIKA BREAD.

Mr. P. L. Simmonds introduced to the notice of the meeting a specimen of Dika bread, from Gaboon, on the West Coast of Africa. He said that it was new to him, and he believed had not been seen before in this country; and he thought, therefore, that some notice of it might be interesting to the Members of the Society.

The Dika bread thus exhibited was in the form of a truncated cone, and weighed about fifty-six pounds. In colour it was a greyish-brown, interspersed with lighter-coloured almond-shaped spots. In general appearance it somewhat resembled some kinds of benzoin.

It is said to be chiefly made from the seed-kernels of a species of mango, which was common on the Western Coast of Africa, from Sierra Leone to Gaboon, and named by M. Aubry-Lecomte *Mangifera gabonensis*. The nature of the other ingredients used in the preparation of Dika bread Mr. Simmonds said were quite unknown to him, but they seemed to be agglomerated and compacted by heat. It contained 70 to 80 per cent. of a solid fatty matter, and burned with a white flame, without odour or smoke. Mr. Simmonds also said that a sample of another kind of native bread, which he had received under the name of *Dika-acola*, was very different in appearance to that now exhibited, for it presented no admixture of the almond-shaped seed-kernels.

Mr. D. Hanbury, upon being referred to by Mr. Simmonds, gave some further details respecting Dika bread. He stated that a notice of it was given by Dr. O'Rorke in the *Journal de Pharmacie*, vol. xxxi., p. 275, a cake of it having been exhibited in the Paris Exposition of 1855.

Mr. Simmonds then called the attention of the meeting to two other products which he had received from the West Coast of Africa. 1st. An undescribed bark, the native name in the Benga language was *Boulsko*. He said that it was unknown about Gaboon, but was used by the natives of Monnaée Bay of Corises to boil with their fish, from having a strong flavour of garlic when fresh—indeed, on chewing it still exhibited that peculiarity. He also said that it was employed in dysentery and other diseases. The second specimen was an undescribed fruit, resembling a small calabash. Mr. Simmonds said that it contained a strongly odorous substance of a resinous nature. This, when powdered, was used by the natives in certain parts of Africa as a perfume for their hair.

MODELS OF CRYSTALS.

Dr. Redwood drew the attention of the meeting to a set of models in wood of the crystalline forms of all those substances used in medicine which were figured in *Phillips's Translation of the Pharmacopœia* and *Pereira's Materia Medica*. These models were made by Mr. Larkin, 2, St. John's Villas, Blackstock Lane, Highbury Vale, by whom they were sold in boxes containing fifty-six models, with a classified catalogue. They were calculated greatly to facilitate the study of crystallography by Pharmaceutica lstudents, and it was under

this impression that he had been induced to bring the subject under the notice of the meeting.

Mr. Waugh inquired the price at which the sets of models were sold?

Dr. Redwood said the price was 15*s*.

PROPOSED NEW WEIGHTS FOR USE IN PHARMACY.

Mr. Squire laid before the meeting a set of avoirdupois weights, with the equivalent in grammes marked upon each weight. He had previously drawn the attention of the Society to the comparative values of troy and metrical weights, but as it was now probable that the avoirdupois weight would be adopted in the forthcoming Pharmacopœia, with a reference to the equivalents in grammes, it was desirable that Pharmaceutists should make themselves acquainted with the relations existing between them.

PHARMACEUTICAL MEETING, EDINBURGH.

The First Meeting of the Session 1859-60 was held in George Street Hall, Edinburgh, on the evening of Friday, 21st October, at 9 o'clock.

There was a good attendance, and, in the unavoidable absence of the President,

MR. YOUNG, VICE-PRESIDENT, TOOK THE CHAIR.

In his opening address he congratulated the Members on the return of another Session, bringing with it its duties and responsibilities, and, it was to be hoped, such a series of meetings in connexion with the Society as would prove interesting and instructive. He could not, however, forget that since they had last assembled in that apartment they had sustained an almost irreparable loss in the death of Mr. Jacob Bell. After expressing a high eulogium upon the late President of the Society, he alluded to the fund which was being formed for the establishment of scholarships, as a fitting means of recording the sense entertained by the Society of the invaluable services which had been rendered by Mr. Bell in elevating the position of the Pharmaceutical body throughout Great Britain; and he hoped that no Member who had the means would withhold his subscription in behalf of so laudable an object.

Adverting to the future, Mr. Young said, he supposed that when the Legislature met again, a poison bill would be served up in the usual form, and it behoved them to be prepared to offer such assistance as they were able in promoting a judicious settlement of that question. It would be curious, he said, to observe in what way chlorate of potash would be treated in the next bill. Should it have a place in the poison cupboard, or should it be included in a new class of medicines under the name of "eliminators?" Grey powder, too, had acquired a somewhat equivocal character in the estimation of some learned doctors, and it would probably be some time before it regained the confidence it had previously so long enjoyed.

He trusted that, in the course of the Session, their representatives in the Pharmacopœia Committee would be enabled to give them some information with regard to the important subjects which had engaged their attention. Some of these subjects would probably come before them at subsequent meetings in the form of papers, and he wished to encourage their younger friends also to contribute matter for the meetings, assuring them that it was not necessary that such communications should be either long or learned. He would not further detain the meeting, but at once introduce to them Professor George Wilson, who, "never weary in well-doing," had, notwithstanding his many other engagements, found the necessary leisure to prepare an address on a very interesting and important subject.

Prof. George Wilson rose, amidst much applause, to read a paper on

THE EDUCATION OF THE PHARMACEUTICAL CHEMIST.

He said, I propose to offer you some remarks on the Education of the Pharmaceutical Chemist. Counting it an honour to be called to address you, I would not willingly waste your time in fulfilling your request.

Having studied the Science of Pharmacy and practised its Art, I have had opportunities of learning what it demands from those who are engaged in its prosecution. In suggesting accordingly some modes in which its study and practice may

be advanced, I shall use all freedom in addressing you, feeling assured that you will not take offence at any criticisms that I may offer, knowing that they are brought before you in sincerity and good-will, and that they are left with you to estimate their value.

This Society, I need not remind you, is not an association of scientific or amateur students of Pharmacy, but a union of those who follow it as a profession, and propose to make it their life-long vocation. It is thus the Art much more than the Science of Pharmacy which concerns you, and your chief object in studying the latter is to increase your power in practising the former. Let me begin then by asking what is your special sphere of action as Pharmaceutical Practicians, and what your most fitting designation or title? The latter may seem a matter of indifferent moment, but we shall find that it will clear the way for important discussions if we can settle what and how much a man is bound to know and to do by the professional title which he takes, or has given him.

The term Pharmaceutical, taken from the Greek word *φαρμακον*, signifying a drug, marks the distinction of your profession to lie in its concerning itself specially with drugs. In a word, whatever else you are, you are *Druggists*. This word is, in Dictionary meaning, the exact equivalent of the French term *Pharmacien*, which continues in universal use in France, and has the great advantage of being, like the titles *Surgeon* or *Physician*, single, but I need not say that very few members of your profession in this country content themselves with the bare title of Druggist. Nor is the reason of this far to seek. The French term has come to carry with it the idea of educated or scientific Druggist. The English term, on the other hand, has till very recently been often applied, as indeed it still frequently is, to the mere drug-merchant or drug-broker, to whom a drug is simply an article of merchandise, to be bought and sold as a marketable commodity. Naturally, accordingly, those who have studied the properties of drugs in the light of Chemistry and other sciences, have been dissatisfied with so imperfect a designation, and have supplemented it by styling themselves *Chemists* and *Druggists*, although strictly speaking the order of the words should have been reversed. Moreover, the word *drug* has come with us to have a somewhat restricted meaning. Without stopping at present to define it further, we may regard it as signifying any medicine or medicinal substance, and such without qualification or restriction is the sense in which its Greek equivalent is used in such words as *Pharmacopœia* and *Pharmaceutical*.

But, if I mistake not, we often limit the term drug to *vegetable* medicines, and to these, moreover, in their crude state. Thus opium is a drug, but a mineral medicine such as *nitre* goes with *drysaltery*. Again, though opium is a drug, *morphia* is never called one; and a similar distinction prevails between Peruvian bark and quinine, nux vomica and strychnia.

In these circumstances the word Druggist has been abandoned, and that of Pharmaceutical Chemist, which is equivalent to Drug-Chemist, adopted. No one can fairly object to the prominence given to Chemistry, for there can be no question that if a Pharmaceutical novice were allowed to study one, and only one, of the various sciences which throw light on Pharmacy, his wisdom would be shown in selecting Chemistry.

At the same time, I need not tell you, for you have abundantly recognized it by your curriculum of study, that other sciences besides Chemistry are essential to distinction in your profession. The French *Pharmacien* is much more than merely a Drug-Chemist. He is learned in the botanical, zoological, physiological, and medical relations of Pharmacy. It is to be regretted that we have no single comprehensive title corresponding to Pharmacien in English. The nearest I can suggest is *Pharmacologist*, although this rather signifies one learned in the science than practised in the art of Pharmacy. For the latter the term Pharmaceutist is preferable.

I do not propose it as a practical professional title, but I shall occasionally employ it in what follows, as a convenient and comprehensive term for a thoroughly accomplished member of your profession.

Thus much premised, we may now attack the problem which this Society daily seeks to solve, "How shall we best train a novice to become a perfect Pharmacologist or Pharmaceutist?" Before endeavouring to answer this question, I would notice that the Pharmacologist stands in a twofold relation to the public.

1st. To the community at large he occupies the position of one who can supply

them on demand with every attainable known drug or medicine, in a state of integrity and purity.

2nd. To that section of the community which constitutes the medical profession, he stands in the same relation as the smith does to the soldier, or the carpenter to the sailor. Or to narrow the comparison, he is to the Physician what the cutler is to the Surgeon. The Practitioner expects from him those concrete medicines which are the weapons of his calling, and in addition he often looks also for suggestions as to what he should give, and how he should mingle and administer it.

The Pharmacologist must thus, not only like other professional men, keep abreast of the general public, but he must follow the pace of its medical section, and be ready at all times to co-operate intelligently with practitioners of medicine. Assuredly, then, the Pharmaceutical profession is a difficult and responsible, as it not less certainly is a useful and honourable, calling.

Returning now to the question, How shall a novice be best trained to become an accomplished Pharmacologist? we shall not suppose ourselves dealing with a wealthy amateur whose time is his own ,and whose education may be prosecuted regardless of expense. On the other hand, we shall suppose him possessed but of moderate means and limited leisure, and as solicitous to learn his profession in the shortest possible time, and at the smallest expense which will enable him to achieve his object, only that object must be honestly and amply achieved.

Into a minute analysis of the requisite studies I am not about to enter. But, for a purpose which will presently appear, I am anxious to ascertain the *minimum* curriculum of Pharmaceutical study. All I think will agree that as regards *the science* of Pharmacy we could not, on the lowest estimate, dispense with three things.

1st. A thorough familiarity with the appearance, and sensible properties such as odour, colour, taste, and the like, of every important drug or medicine, natural or artificial, whether derived directly or indirectly from the mineral, vegetable, or animal kingdom.

2nd. A knowledge, the greater the better, of the chemical nature or composition of all the important drugs or medicines.

3rd. A general acquaintance with the physiological action or influence on the living body of the chief medicines in use.

This last requirement may seem to some less justifiable than the others. None, however, I imagine, will deny that he cannot be considered an educated Pharmaceutical Chemist, or even a safe dispenser of drugs, who does not clearly understand why certain of them are grouped together as narcotics, others as diaphoretics, others as anæsthetics, and so on. The mistake is constantly made of imagining that chemical analysis can determine whether an unknown body is, for example, poisonous or wholesome. Now, directly, analysis throws no light on such a question. Indirectly it may, as when it draws attention to a vegetable product being an alkaloid, having the same crystalline form, and containing the same chemical elements as veratria, or the similar poisons, and warns us against rashly taking or administering it. But, after all, till some living creature swallows or otherwise receives into its system the untried substance, and its effect upon that creature is observed, we must continue in utter uncertainty as to its physiological action. It may turn out to be eminently wholesome, like caffeine; a powerful narcotic, like morphia; an exciter of tetanus, like strychnia; or an arrester of the heart's action, like veratria.

Again, morphia and strychnia have a different, though resembling, composition, and we may infer their dissimilarity in properties to be connected with this difference in composition. But no Chemist, asked to tell which of the two was narcotic, could, *as a Chemist*, attempt any reply to the question.

So also a common character of wholesomeness runs through the more abundant vegetable acids, yet in perhaps the most abundant—viz., the oxalic—deadly poisonousness appears, although its elements are the same as theirs, and the proportion of those elements differs very slightly from that found in carbonic acid, which, as taken by the stomach, is one of the most harmless of substances.

This is a long episode, but of purpose. I have no hesitation in saying that a Pharmacologist, able to afford himself an additional pure scientific class, would act more wisely in selecting Physiology than Botany, although the latter is generally supposed to be much closer to Pharmacy than the former. Botany assuredly is a delightful study, and as it can be prosecuted in Edinburgh, affords a most welcome relief to all who can escape from the bondage of a laboratory. But in its direct

bearing on the Pharmaceutical profession, it cannot compare with Physiology, and in a minimum curriculum the latter must have precedence.

I need scarcely, I suppose, say, that *Materia Medica*, as taught in Edinburgh by my distinguished colleague in the University, Prof. Christison, and beyond its walls by my fellow Honorary Member of your Society, Dr. Douglas Maclagan, includes the consideration of the second and third points I have referred to, besides much else. In truth, these courses discuss the botanical, chemical, physiological, and medical aspects of both Dietetics and Pharmacy, so that one able to reap their full advantage, would, by following them alone, become accomplished in the science of Pharmacy. But they take for granted more preliminary knowledge than your students possess, and are addressed to those who have attended special courses on Botany, Chemistry, Physiology, Practice of Physic, &c.

Still the medical courses of Materia Medica may be regarded as summaries of the science of Pharmacy, and they insist on much more than my minimum curriculum proposes, and may be referred to, therefore, as sanctioning it.

Having thus disposed of the minimum amount of Pharmaceutical *Science*, let us now consider *Pharmaceutical* Art. Here again we cannot dispense with three things:—

1st. Thorough familiarity with all the ordinary processes of practical Pharmacy, such as tincture-making, decoction-making, pill-making, and the like.

2nd. Such a knowledge of practical Chemistry as will enable the Pharmacologist to test or analyze qualitatively all the ordinary drugs and medicines employed by him.

Here let me observe that I am not demanding from the Pharmacologist the analytical skill of a trained scientific Chemist, although for his own sake I would urge him to prosecute diligently the art of analysis, but only so much as will enable him to protect himself against professional injury, from others designedly or unwittingly supplying him with impure, adulterated, or, it may be, sham drugs, and will give him confidence in serving those who deal with him. For example, sulphuric and muriatic acids frequently and unsuspectedly contain arsenious acid, and transfer that powerful poison to the medicines, and in the case of muriatic acid, to the bread prepared with them. A Druggist who should innocently be the party through whose hands such impure acids, manufactured by others, passed to the general public, would, especially if a young man, seriously compromise himself in general opinion, were he to confess that he did not know how to test the acids in question. Nay, after the decision in the famous Newcastle sheep-dipping case, on the justice or injustice of which I offer here no opinion, it is apparent that the law holds the vendors of poisonous substances liable for the unforeseen fatal results of their application to living animals of high market value, to an extent which must compel every Pharmaceutical Chemist to become a Chemist in reality as well as in name.

To return. We require—3rd. Accuracy in reading and interpreting medical prescriptions; in calculating from a first formula the quantities which must be increased or diminished without altering their relative proportion; in writing a lucid and legible label, such as ignorant nurses or others will not misapprehend.

This third requirement in reality includes many. For brevity's sake I leave it unexpanded. How many fatal accidents have occurred, and are daily liable to occur, from its neglect or imperfect fulfilment, I need not say.

There is no senior here, I presume, whose memory does not, like my own, retain with painful tenacity the record of many a sad occurrence in connexion with the misinterpretation of prescriptions.

Let this be our practical Pharmacological minimum. I have omitted, you will observe, all reference to Pharmacy as a trade or business, but assuredly the Pharmacologist is a labourer as worthy of his hire as any other, and to qualify him for success in a pecuniary point of view requires attention to many points not included in my minimum. To these it is not necessary to refer, further than to say that they are not only compatible with the attainments, scientific and practical, insisted on as imperative, but that they will render business capacity far richer in money fruits than without their aid it could be.

Assuming, then, that we have agreed to a curriculum of study for professional Pharmaceutists, how shall we secure its demands being fulfilled? Looking upon the curriculum through which every young Pharmaceutist must pass, as fitted and intended to do him a signal professional service, I am compelled to consider these

preliminary questions, "Are there any hindrances in the way of his profiting by the appointed scheme of study, and can these hindrances be lessened or removed?"

Now there seems to me three great obstacles to the progress of the young Pharmaceutist, as his education is at present conducted, which call for and admit of removal. These are—

1st. The long apprenticeship required from beginners.

2nd. The long hours of daily work.

3rd. The Sunday work.

I am, I trust, thoroughly alive to the delicacy and difficulty of the topics I have named. To pronounce dogmatically upon them is the last thing I shall designedly do. Three different parties—the apprentice, the master, and the general public, are concerned in their adjustment, and their interests are supposed to clash. I believe, however, that the interests of all three are the same, and having been for four years a laboratory apprentice, and some eighteen a master of laboratory apprentices, as well as for many years an invalid member of the general public, specially interested in practical Pharmacy, I hope I may, without being charged with presumption, offer a long-considered opinion on the points in question.

First, then, of apprenticeship. There can be no dispute as to the wisdom of requiring every Pharmaceutist to serve an apprenticeship. It is the only machinery by which he can be trained to a practical acquaintance with his profession, and if he makes good use of his opportunities, it will assist also in the acquisition of Pharmaceutical science.

On this point the judgment of all competent parties will, I believe, be unanimous, but there is no prospect of any such unanimity in reference to the number of years over which the apprenticeship should extend, and the period of life at which it should commence. At present the apprenticeship appears to me too long and too early begun. My objection is much more to its early commencement than to its long continuance, but the two almost unavoidably go together; for only the young can be expected to bind themselves to a protracted apprenticeship.

In offering this objection, I regard apprenticeship simply as a means of *instructing* the Pharmaceutical novice. There may be other and valid reasons why an apprenticeship should be long, as, for example, that at the commencement the boy was of no use to his master, and that it is only just that after the latter has trained him to usefulness, he should reap the fruits of his skill and care by retaining his pupil's services. There may be truth in this, although I believe there is less than is generally imagined, and that the master would gain more from the three years' apprenticeship of a lad who began at seventeen, than the five years of a boy who began at fourteen.

But, however this may be, I feel strongly persuaded that all that an apprenticeship can teach, it may be made to teach in two years, and that, considered as a means of instruction, it should not extend over more than three. I would not speak thus confidently had not a similar, but much stronger, conclusion been reached by competent parties, in reference to professions the practical operations of which would seem to demand a much longer apprenticeship-training than those of Pharmacy do.

I understand that the Pharmaceutical apprenticeship usually extends to five years, commencing at fifteen, and that the details of a Pharmaceutist's business are so many that a shorter period will not, in the judgment of the most considerate and intelligent seniors, suffice to give a mastery over the minutiæ of their calling. With this judgment, as looked at from one point of view, I do not quarrel. There is probably no profession demanding intellectual training and effort which can be learned in fewer than five years. Six years are formally devoted by most clergymen, lawyers, and medical men to the deliberate study of their professions. Very few, I believe, are thoroughly established and feel full self-reliance till ten years have passed. I willingly admit, accordingly, that if the Pharmaceutical apprenticeship nominally ended at the close of three years, practically it must be prolonged, under the title of assistantship or the like, for two or more years, till the novice was thoroughly trained to his calling. It would still, however, admit of question whether the whole five years should be served under one and the same master, and under the same restrictions all throughout; but into this question I will not enter.

The mere length, then, of the apprenticeship is not half so important a matter as the period at which it begins and the way in which it is spent.

Now, I am constrained to say that the general education of exceedingly few boys is so advanced at fourteen, that it can be wise for them to commence a five years' apprenticeship at that age. I have no means of judging of the special accomplishment of those who, at this time of life, enter on Pharmacy as a profession, but I cannot be far mistaken in assuming it to be not greater than is found in medical students of the same age. I venture, therefore, to infer that a large number of your novices are imperfectly acquainted with their own language, as regards its grammar and orthography; that their knowledge of arithmetic is generally defective; and that, in many cases, their handwriting is far from legible. As for Latin, which has a special relation to Pharmacy, the majority, I imagine, have at best an obscure and uncertain acquaintance with its rudiments, and cannot comfortably translate a sentence. Of modern languages, I take for granted they know nothing, and that they have but a scanty stock of general information.

I speak here of the whole country, but in no spirit of depreciation. Ask the medical examiners all over the island how many immaculate spellers of English words and accurate employers of the first four rules of arithmetic they encounter, and they will shake their heads deprecatingly, and decline to reply. Ask the Civil Service Commissioners the same question, in reference to the competitive examinations for places in the Government offices, and they will refer you to accessible blue books, which show a sad deficiency in the preliminary training of a host of their candidates. The London Society of Arts has a similar tale to tell in reference to its examinations, and the whole island was startled a year ago by the result of the Oxford middle class examinations, which showed that the pupils of the most famous schools all over England, the sons in many cases of rich men, and under the training of those who were reputed to be the best teachers in Anglo-Saxondom, often signally failed in the most elementary branches of knowledge.

In the light of these facts it would be folly to expect great erudition from your apprentices at the beginning of their course. Considering, indeed, the rank of life from which they come, it would be unfair to blame them even if their learning were less than that of those whose parents could afford them a liberal education, and assist them at home in acquiring it.

A boy thus imperfectly educated makes a false start in his profession. Its demands upon his time and thoughts from the very first preclude him from making up his deficiencies. In the majority of cases he never succeeds in mastering his own language, and he shrinks from attempting to learn others. The nomenclature of the sciences repels him, and he does not readily follow the phraseology of scientific treatises. He may learn empirically to read the more familiar Latin prescriptions, and to render their meaning in English, but he has not that confidence which thorough knowledge gives, and he is liable to commit most serious mistakes. In truth, there is no profession but ours where a boy is so early called upon to discharge duties which involve the life or death of others—and none, I am compelled to add, where the qualifications are often so disproportionate to the responsibility of the duties.

I lament this state of matters, as injurious to all concerned. The apprentice suffers: he is debarred from grounding himself in elementary knowledge, at the age when such knowledge is most easily acquired and most firmly retained; he is required, on the other hand, to discharge duties the significance, importance, and responsibility of which he cannot, at his time of life, appreciate.

The master suffers, and in proportion to the boy's ignorance. Much that he would gladly teach the apprentice, the latter cannot apprehend; much in the way of work which he would require from the novice, the latter cannot be trusted to perform.

The public suffers; for, as in the case of the young doctor, it is largely by experiments on the public that the young Pharmaceutist learns his profession, and they must often pay the penalty of his ignorance.

The whole three parties concerned are thus losers. To appearance the master is a gainer, for he may hope for three, or at least two, years of good work out of the five years' apprenticeship. But the gain here, I sincerely believe, is, to a great extent, delusive. Had the boy, instead of spending his fourteenth and fifteenth years in the laboratory, spent them at school, more and better service would have been obtained from him.

I have a strong conviction, that were a master, instead of paying an apprentice and setting him to work all day from the first, to bestow, in whole or in part, the

sum which he now gives* on the preliminary education of the boy, keeping him under his own *surveillance*, and requiring only a limited attendance at the laboratory, he would, in the end, reap far more from the labour of the youth than in the great majority of cases he does at present; whilst the youth himself would be not less a gainer, and the public at large would doubly profit by the arrangement.

I would earnestly press this suggestion on you. And on you I press it, not because you alone are responsible for the present system, but because you can take the initiative in altering it.

For the evils of the present system all parties are responsible. Parents and guardians often most unwisely, and even unconscientiously, rid themselves of the difficulty of training a boy, by binding him to a five years' apprenticeship, and securing to themselves the same interval of freedom from particular concern about him. Or, from totally opposite views, they hasten to put him, as they say, in the way of providing for himself, and rejoice at his receiving wages from the very first. In a third set of cases, the father, with a troop of sons about him, whom he can scarcely feed and clothe, and whom he despairs of educating, or the pinched widow, with her orphan boy, count themselves favoured of God and man, if the Joseph or Benjamin of their love is accepted as apprentice by a respectable master.

As for the apprentice, he is generally, at the commencement at least, a heartily consenting party, and never almost a strongly opposing one. Too frequently the thought of escaping from the bondage of learning lessons, is the determining cause with him, and he submits to far heavier chains than those of the schoolroom, declaring all the while that now he is free.

As for the master, he would only too gladly welcome a higher class of *entrants*, could he attract them. He follows the traditional rule of his calling, and finding that the boys who offer themselves as apprentices, and whom he is constrained to take, are of no use for some time but in running errands, dusting bottles, counting out leeches, or the like minor drudgeries, he recompenses himself for the slender services thus rendered him, by protracting the apprenticeship till he who was a child, and spake and thought as a child, has become a man, and put away childish things.

The plan I have suggested, I am well aware, is opposed to all the arrangements at present in vogue in laboratories. The youngest apprentice is the servant of servants. He may be treated with perfect kindness, but so far as his strength and knowledge permit, he has all the more menial tasks and irksome drudgeries to undertake. To pet or specially educate him appears absurd. All above him have gone through the rough novitiate which he is practising, and in due time a still younger apprentice will come in below him and relieve him of his least pleasant duties, after which he will gradually be promoted as his predecessors have been.

Such a system of subordination must always exist, and the rule which requires the youngest to undertake the meanest tasks, and to bear the yoke in his youth, is a just and rational one, which I should regret to see infringed in the slightest.

At the same time, however, we must not forget that the youngest apprentice in a laboratory, containing several apprentices and assistants under a master, stands to these seniors in a relation similar to that which the youngest child in a family does to his elder brethren and their common father. You may smile at this comparison, but it is a just one, and will help us to appreciate the claims of a laboratory novice. He is the youngest, weakest, least instructed, least accomplished, and least experienced in the laboratory circle. More than any other in that circle accordingly he needs support, instruction, and guidance, and it is no wrong to his seniors to bestow those needful helps in largest measure on him. Moreover, he is at an age when the power of acquiring many kinds of knowledge, both theoretical and practical, is much greater than at any later period of life: so that instruction in such branches, bestowed upon him in his early youth, will yield a larger return than if withheld till he is older, and a permanent wrong will be done him, if he is left uninstructed whilst the inquisitiveness of boyhood is still eager and unsated.

It may help us to do justice to this matter, if we suppose a model laboratory, or training school of Pharmacy, where, beginning with boys of fourteen, we endeavoured

* The practice in Scotland in regard to apprentices differs from that which prevails in England. In Scotland, the master, instead of receiving a fee with the apprentice, pays him a salary from the commencement of the apprenticeship.

to make them by a five years' discipline Pharmaceutical Chemists, but without expending, directly or indirectly, in the shape of salaries, class fees, or examination fees, a larger sum than you expend. Imagine such an institution taking boys as they offer, without special selection, as you are compelled to do, and only concede this privilege that the boys once admitted into the institution are entirely under the control of its managers, without interference of parents or others.

Under such an arrangement, the first thing done with a novice would be—not to give him the keys of the laboratory and a duster, and bid him see that the place was opened at seven, and all the bottles dusted before he went home to breakfast. The first question would be, what amount of education did he possess? Could he read, write, and spell his own language readily and accurately? Had he any knowledge of Latin? Was he master of the first four rules of arithmetic? What amount of general information did he possess, as of geography, history, natural history, English literature? When the extent of his deficiencies in these branches had been ascertained, steps would be taken to teach him with the least possible delay those which were essential to his becoming a Pharmaceutical Chemist. It might be quite compatible with this that he should at once take charge of the door-key, and begin wielding the duster, and that from the first he should devote some hours of the day to laboratory drudgery. But before this and everything else, his intellectual education should be provided for, as a thing indispensable, the seeds of which could never be sown to such advantage as in the spring-time of his youth, and which, the sooner they were sown, would the sooner produce fruit. In the wisdom of such a step all, I imagine, would concur, even if we regard our apprentice, as it were through the eyes of Mr. Rarey, merely as a docile young creature, whose value when he reaches his prime will be greatly determined by the training he has received, we should be guilty of folly in neglecting or postponing for a day his education up to the point at which he can, with well-founded confidence, undertake the simpler duties of his calling, and from which he can intelligently anticipate, and prepare for the more difficult tasks on which he must ultimately enter.

Would then such an experiment not be worth trying even as things are? It would assuredly be far better if the master could obtain apprentices properly educated before they came into his hands. But since he cannot, would it not be well for him, even for his own sake, to subject them to a general training, such as should qualify them for the special study and work of their calling?

I am earnest in this matter, because my own experience, and that of every fellow-teacher with whom I have conversed on the subject, has been, that perhaps the majority of students who devote themselves to professions fail to make the progress they otherwise would do from imperfect preliminary education. On the other hand, where they bring to professional study minds already stored with general information, and disciplined in the use of the languages and sciences, as keys to learning and instruments or tools for acquiring and retaining knowledge, it is astonishing how swiftly they shoot ahead of those not similarly accomplished. In the course of the last twenty years I have come as teacher into close contact with mechanics, agricultural students, veterinary students, medical students, and the general public, and have acted as examiner to six different boards or institutions. With all classes my experience has been the same. The majority of the pupils do not bring to professional study a sufficient amount of preliminary knowledge to turn to full account the special instructions they receive. The same rule applies to laboratory pupils. An educated youth, *ceteris paribus*, becomes a practical analyst twice as fast as an uneducated one. A better preliminary education, accordingly, has long appeared to me the great desideratum for all classes of our students. It is, if possible, still more essential to your students than to others, seeing that almost from the first day of his novitiate you require responsible duties from your apprentices. And seeing that you have them five years under your control, you can do much towards securing that a proper preliminary education is made the foundation of their five years' study and work.

As for the other subjects referred to, I shall deal with them much more briefly. The second hindrance to progress in Pharmaceutical studies named, was—

2nd. The long hours of daily work.

I may have seemed to some of you to have the interests of the boy-apprentice only at heart. In reality, however, I contemplate him as an undeveloped assistant, and the assistant as an undeveloped master. They are, if you will permit the comparison,

respectively the Pharmaceutical caterpillar, chrysalis, and butterfly; and it is only because the butterfly takes its characters from the caterpillar that I dwell so much on the latter. There is no doubt a stage before the caterpillar, which determines all the subsequent developments of the germ, but as we can't influence that, we count from the worm, with which we are compelled to begin.

This, however, is a digression. The long hours during which Druggists' shops are kept open must be regarded by all as a crying evil, so far as the apprentices, assistants, and likewise the masters are concerned.

It most seriously hinders the progress of the two former by preventing them attending evening classes, and perhaps even more by sending them home too exhausted to turn the last hours of the day to good account as students. Having known myself during four years what it was to come home from the infirmary laboratory every night at ten, to begin study thereafter, I strongly sympathize with those who are similarly circumstanced, and long to see their condition altered.

The parties mainly to blame for this evil are the general public; but I cannot forbear adding that they are abetted in it by Medical Practitioners, and that, till the latter assist in the matter, Druggists will not share in the benefits of early closing. It took a long time to persuade the public that a little foresight and prudential management would enable them to purchase all that was needed for their daily wants, during the day, and that they would not die of hunger or nakedness if the baker and the clothier closed their shops at winter sunset. They are now satisfied on that point, but they still make an exception, in their own favour, against Druggists, alleging the risk of sudden illness in a family, the unexpected change in symptoms, demanding change of treatment, which are constantly happening to sufferers from comfirmed disease, the poisonous character of most active medicines, and the impossibility of keeping stores of them in private houses to meet emergencies, and much else. The best of men are rendered selfish by illness; and the general public, which contains but few of the best of men, when it falls sick, is exceedingly sorry for itself, and very indifferent to the welfare of everything else. In its sick moods it would, if it had the power, pass a bill, the very reverse of a Forbes Mackenzie Act, and ordain that Druggists' shops should never shut at all.

We must make allowance for this feeling, and provision for the demand which it exaggerates. If Pharmaceutists, though by a tacit bond, enter into a covenant with the public to furnish them with medicines, these must be forthcoming whenever the Physician or Surgeon prescribes them, and it would ill become one who, like myself, has often been the cause of disturbing visits to Druggists at untimely hours, to reproach other invalids or their friends for being reluctant to hear of Druggists' shops closing early. At the same time, my gratefulness for the relief from suffering, which I have thus secured, makes me, as a member of the general public, plead with my fellow-invalids and their friends that we owe it to those who helped us in our extremity, to lessen to the utmost we can the burden of those exactions which our infirmities lay upon them.

That the legitimate demands of the sick public, except in seasons of epidemic, would be a much smaller number of persons than are kept on Pharmaceutical duty till a late hour, no one can question. It is sufficiently proved by the fact that every summer sees this very public scatter itself over the whole country, and spend continuous weeks or months without alarm or injury, in districts where Doctors are great rarities and Druggists are unknown. I do not attempt to demonstrate how best the interests of the sick public and those of the overworked Druggist can be reconciled, but I cannot doubt that the earlier closing of Druggists' shops is merely a question of time, and in the hope of hastening its arrival I venture to offer two suggestions, addressed to the parties who can do most in altering the present state of matters,—viz., the Doctors, and the masters.

1st. Medical men could do a great deal towards lessening the evil under notice, if the practice adopted by some of carrying with them a supply of the more powerful remedies were more general. After all, the medicines needed in urgent cases are few and not bulky. A case not larger than a snuff-box would contain them, as the experience of years has proved to the satisfaction of more than one medical man known to me, engaged in extensive practice. Many practitioners, I am well aware, shrink from the idea of supplying their patients with medicines, alike from the feeling, which has always been strong in Scotland, that the Medical Practitioner should be paid for his advice, and keep himself free from any temptation to multiply

prescriptions for the sick; and also from the desire to avoid interfering with the rights of the Pharmaceutical Chemist.

I should be the first to regret that my medical brethren changed their views on these matters. But the case before us is an urgent one, and justifies a departure from ordinary rules. It would not compromise the dignity of the most accomplished Physician to carry with him a small supply of opiates, emetics, anæsthetics, cathartics, and the like, along with some blistering tissue; and the Pharmaceutical Chemist who replenished this stock from time to time would not grudge the loss of a prescription or two, when it secured him a long evening to himself.

2nd. With great deference I suggest, that masters might make arrangements which would greatly abate the evil. Could not this city, for example, be divided into districts, and one shop only be open in each after a certain *comparatively* early hour. I have too much faith in the good feeling of the Pharmaceutical Chemists of Edinburgh to be afraid to offer this suggestion. I know, at least, that you will take it in good part. On the North Bridge, for example, might not Messrs. Duncan and Flockhart on the one hand, and Messrs. Macfarlan on the other, take the late work alternately, night by night, or week by week, so that both establishments should not be open at once? Might not Messrs. Baildon and Messrs. Duncan and Flockhart do likewise in Princes Street; Messrs. Robertson, Gardner, and Mackay, in George Street? I feel how presumptuous I am in interfering thus, but I only wish to suggest that some method might surely be devised for reducing the number of young men kept on late duty all over the town, by different establishments taking in turn the whole duty upon them.

Many other suggestions occur to me, but I forbear to mention them. I am only anxious that the necessity for altering the present system of late shop shutting, if the standard of Pharmaceutical education is to be raised, should be kept fully in view. The public must be distinctly told how unreasonably selfish it is. The hearty co-operation of medical men must be invited; and the *esprit de corps* of the whole Pharmaceutical profession must be appealed to, to consent to some sacrifice and practise some self-denial, in order to secure to its younger members a full training in their important vocation.

For my own part, allow me to say that I am the mouthpiece of no party in speaking thus. I am giving utterance only to my own deep convictions, founded on my personal experience of the formidable obstacle which protracted laboratory work puts in the way of evening study. The young men of most other professions have already secured their evenings to themselves, besides in many cases half-holidays on Saturday, and in all cases the whole of Sunday. This leisure they devote to favourite pursuits, resting from professional labour during these intervals.

The younger members of the Pharmaceutical profession, on the other hand, who require the evening for professional study, cannot get it for that, not to speak of getting it for recreation. They ought to be botanists, but no half holiday allows them to gather digitalis, or hyoscyamus, or conium maculatum growing wild. They constitute the only profession which, as a profession, suffers from late shop-closing, and they are the only profession which the public will not assist in securing for itself shorter hours of work. They have a better claim than almost any other profession to the entire Sunday to themselves as a day of rest, but the residue of the community, religious and irreligious, Sabbath-keepers and Sabbath-breakers, are unanimous in exacting from them a Sunday of work instead of a Sabbath of rest. This brings me to my last topic, the hindrance to the progress of Pharmaceutical students occasioned by their

3rd. *Sunday work.*

Physiologists have long recognized a law of periodicity as presiding over the functions of living organisms in health and disease, but they have not, so far as I have learned, hitherto affirmed that more persons fall ill upon the Sunday than upon other days of the week. Yet apparently it is so, and every Druggist's shop in Edinburgh must be open for a large part of each Sunday, to provide alleviation for the stricken sufferers. Nevertheless, strangely enough, these afflicted persons are not to be found on the sick-list on the Monday morning, neither do their names appear among the "much and deeply regretted" deceased ones, whose "friends are requested to accept this intimation."

They have been favoured with as swift a recovery as they were visited with sudden illness.

To speak gravely, both Doctors and Druggists are largely cheated out of their Sabbath by the selfish inconsiderateness of even those who exalt the claims of the Sabbath. Men and women will tell you openly that they cannot afford to lay themselves up on a week day, but they will do so on the first Sunday, and then they will try such and such a medicine, put on leeches, or submit to such and such treatment, and all the while they totally forget the Sabbath claim of the Druggist; and though they might have furnished themselves with all he could supply on the Saturday, leave everything unfurnished till Sunday, and take it much amiss if his shop is closed at any hour of the sacred day. I am sure that in repressing this unreasonable demand for Sunday-work, medical men would heartily co-operate with Druggists; and all that comes under the category of necessity and mercy, could be provided for by a comparatively simple machinery, and the employment of few persons. If, in all Judæa, there were but six cities of refuge for the man-slayer; if, to a regiment of 500 soldiers, there are but two surgeons; if, to a whole ship's passengers and crew, there is often but one doctor; then surely it needs not several Druggists in every street to save the inhabitants of this or any other city from perishing from lack of medicines every Sunday.

You will perceive that I blame the public, and not its lower members, for the Sunday labour exacted from Druggists. We must not forbear protesting against it till it is immensely diminished.

It is a cruel thing to rob a hard-worked man of his Sunday, and make him lose count in his weeks, because all his days are week days. It is still more cruel to inflict this robbery on one whose days are not only all week days, but all work days. It is cruellest of all to be guilty of robbery where you impoverish him who is robbed, without enriching the robber. All the amount of Sunday Pharmaceutists' work which would require to be done, if only what could not be postponed without injury to the sick were undertaken, is so small, that three or four persons could do it all. It is painful to think how many young men lose their Sundays alike as days of rest to body and mind, and as days of spiritual refreshment and communion with God, in order that one or two lazy persons may be able to purchase lozenges or smelling salts, to keep them from sleeping too soundly during the religious service they are creeping to attend.

A Sunday may be well spent in many ways besides in church, but I know few less satisfactory ways of spending it than in satisfying trivial demands behind a Druggist's counter. The time, I trust, is close at hand when you will be able, first, to count each Sunday as "*Dies Non*," secularly no day; and, secondly, to mark it as a "red letter day," the day of days, the most blessed of the week.

I have detained you far too long. I have left many matters I wished to refer to untouched. If I have said anything that has given pain or offence to those present, it has been unintentional, and I trust will be forgiven. A candid criticism is better from a friend than a vapid eulogy. I have spoken candidly and earnestly, because of the deep interest I have in your exaltation as a profession. You cannot go back. You have committed yourselves to the nation to go forward. Even if you wished to halt, the medical profession would compel you to advance or to leave the field altogether. A great change in the laws regulating the medical schools and corporations is raising day by day the standard of medical education, and the leaders of those bodies beckon you to follow them in their upward ascent. Men of science, accustomed to see Continental Pharmaciens, the authors of profound and original investigations in Botany, Chemistry, Toxicology, &c., long to welcome you among them. The public, dimly conscious of its deep debt of gratitude to you for all your care of its health and alleviation of its sufferings, will soon awaken to its full obligations to your profession, and give it a high and honourable place in its estimation. A great future is before you. See that everything is done to hasten its fulfilment.

Mr. MACFARLAN proposed a vote of thanks to Professor Wilson. He thought that there were many topics touched upon in the course of the address which demanded inquiry and attention. In regard to late hours, a question of great importance was involved, as it had been his own experience that the hardest worked and working pupil became the best Pharmaceutist. The hour being pretty far advanced, he concluded a few further remarks by proposing a hearty and cordial vote of thanks for the Professor's able and interesting paper.

This was seconded by Mr. Robertson, who stated he had listened with much pleasure to the address. He thought that if the suggestion regarding the lessening of the hours of labour, more especially during the Sabbath, were carried out, that it would be for the benefit of the whole profession, as there was much unnecessary traffic in medicine carried on during that day simply because the shops were open. It afforded him much pleasure to second the vote of thanks to Professor Wilson.

The Chairman, amidst much acclamation, conveyed to Professor Wilson, in the name of the Society, thanks for his valuable paper, to which Professor Wilson replied, and hoped that none of his remarks had given offence, because such had not been intentional. He referred to his own experience when driven by the rule of the Infirmary to study late at night; and, in concluding, requested that he might be allowed to offer a prize, to be given to the most proficient pupil of the Society who, during the first examination, proved himself to be best acquainted with English and arithmetic. He further begged to place at the disposal of the Council a ticket to his winter course of Lectures on Technology, with the view of enabling them to dispose of the same as a gift to some deserving student connected with the Pharmaceutical Society.

The Secretary intimated that a prize would be given for the best essay on any Pharmaceutical or Chemical subject. Papers for competition to be sent to him on or before 1st March, 1860, and the competition to be open to Associates and Apprentices throughout Great Britain. A few remarks regarding the Library and "Bell Memorial" concluded the business, and the meeting adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Second Meeting of the Session was held in the Royal Institution, Oct. 27, 1859;

THE PRESIDENT, DR. EDWARDS, IN THE CHAIR.

Messrs. A. King, E. S. Sweetman, and W. Robinson, were elected Members. Mr. E. Astin was elected an Associate.

Dr. Nevins delivered an interesting and instructive lecture "On the Polarization of Light," with microscopical and experimental illustrations.

Royal Institution, Nov. 10, 1859.

Mr. J. Outram was elected a Member. Messrs. W. Church and R. Lester were elected Associates.

The Secretary announced the following donations to the Library and Museum:—*On the Morphology of Plants*, from Dr. Collingwood, the author (two copies); *The Influence of the Microscope upon the Progressive Advance of Medicine*, from Dr. Collingwood, the author; Liquor and Extract of Erodium cicutarium, Pyrophosphate of Iron, and Citrate of Iron and Strychnine, from Messrs. Higgins and Cattle; Arbutna Root, from Mr. F. H. W. Jackson; Linseed Cake, from Mr. A. King.

In consequence of the pleasure and interest experienced in the study of microscopical science, several Members have recently expressed a desire that the Council should procure a microscope for the Association. The subject was taken into consideration at a late Council Meeting, and approved of, and an excellent instrument having been purchased, was laid upon the table. It is intended that Members and Associates shall have the use of it at their own residences, under certain regulations.

Mr. H. S. Evans delivered a lecture "On the Pharmaceutical History of Scammony," in which he traced its use in medicine from the earliest dates on record down to the present time, entering minutely into a description of its various physical characters as met with in commerce, and pointing out processes by which its commercial and medicinal value were determined.

The lecture was illustrated by a considerable number of specimens on the table, and several methods were shown by which adulterations might easily be detected.

After a vote of thanks to the lecturer and chairman, the meeting separated.

ORIGINAL AND EXTRACTED ARTICLES.

MALAMBO BARK.

The origin of this aromatic bark, which has been a disputed question ever since its introduction to Europe by Bonpland in the year 1814, has at length been satisfactorily determined by Mr. H. Karsten, of Berlin. A residence of twelve years in the northern countries of South America has enabled Mr. Karsten to make many interesting and important observations on the vegetation of that botanically rich region, the results of which observations he is now communicating to the scientific world in a magnificently illustrated work, under the title of *Florœ Columbiœ Terrarumque adjacentium Specimina selecta.** From this work, in which the Malambo tree is beautifully figured, we extract the following description and remarks :—

Croton Malambo Krst. *Euphorbiaceœ* R. Br.

Character differentialis.

Arbor foliis ovalibus, crenato-serratis, glabris basi bi- et in crenaturis uni-glandulosis.

Character naturalis.

Arbor duodecim- vel quindecim-pedalis in littoribus australibus maris caribæi habitans, trunco recto quadripedali, cortice suberoso flavescenti odore camphoreo-aromatico prædito, tecto; cacumine ramoso ellipsoideo; foliis alternis, glabris hircino-odoris glandulis oleiferis, pellucido-punctatis bistipulatis, — stipulis minutis linearibus, acutissimis, caducis,—longe petiolatis, petiolis 1—2½ pollicaribus, lamina ovali basi rotundata excisa, subtus utrinque glandulam minutam, patelliformem gerentibus, margine crenato, in crenaturis glandulam illis similem fovente, 4—5 pollices longa 2—2½ pollices lata.—Inflorescentia terminalis racemosa, monoica. Flores bractea minuta, caduca sustentati, feminei inferiores 3—8, longe pedunculati, majores. Calyx campanulatus, quinquepartitus persistens, lobis lanceolato-triangularibus, margine pilosiusculis, æstivatione valvatis. Discus glandulosus hypogynus quinquedentatus; dentes (petala rudimentaria) filiformes, longitudine calycis urceoli, apice pilosi, subpenicillati, cum lobis calycinis alternantes. Ovarium pilis stellatis caducis hirtum, triloculare, loculis uniovulatis; styli tres basi pilorum fasciculo penicillato tecti, bifidi, stigmatosi. Flores masculini superiores plures, breviter pedicellati. Calyx quinquefidus extus pilis stellatis hirtus, lobis triangularibus, æstivatione valvatis. Petala quinque, lobis calycinis alterna, lanceolata, longitudine calycis, hyalina, intus pilosa et margine fimbriata, evanescentia, æstivatione imbricata. Stamina 18—20 disco piloso, decem crenato inserta; filamenta libera, subulata, glabra, per æstivationem erecta; antheræ ovales birimosæ basi affixæ. Pollen globosum granulosum. Ovarii rudimentum nullum. Fructus sub-globosus 3‴—4‴ in diametro, stylorum residuis coronatus, lævis, glaber, capsularis, tricoccus, coccis monospermis ; seminis (haud maturi) testa flavescens. Floret Majo.

The preceding species is distinguished from every other of the genus *Croton* (as we find from Baillon's recent labours on this family) by the 10-sided glandular ring of the male flower and the position of the stamens in the bud, which while in this state are not incurved, as is usual in the genus, but stand perfectly erect. To found a generic division, however, upon these characters appears unnecessary. To the sub-genus *Eucroton* (Baillon, *Etude générale des Euphorbiacées*, 1858) *C. Malambo* is in close proximity. From the very few species with glabrous leaves with which *C. Malambo* may be compared, the latter is distinguished by its *oval* leaves from *C. castaneifolium* L. (*Sp. Pl.*, ed. 1), which has *lanceolate* leaves; and from *C. ovalifolium* Willd. and *C. microphyllum* Lom. by its branches being glabrous and not hairy.

Croton Malambo grows in the neighbourhood of the Caribbean Sea on the north coast of Venezuela and New Granada, in the former of which countries it

* Berlin, F. Dümmler, folio.

is known by the names of *Torco* or *Palo Mathias*, and in the latter by that of *Malambo*. In New Granada especially, it is of very frequent occurrence in the country lying between Rio Hacha and Carthagena, where sometimes in the low forests of the coast it prevails to a vast extent. Its stem, which grows to a height of four feet, is covered with a yellowish-white, rough, externally somewhat corky bark, which possesses a very aromatic odour resembling that of *Calamus aromaticus*. The leaves have, when bruised, a peculiar hircine odour, which is not very agreeable. The bark is a remedy of considerable reputation throughout all Columbia; its aqueous infusion is used inwardly in diarrhœa and as a vermifuge, while the alcoholic tincture is employed externally in rheumatism. Its application for these purposes is extolled by both the medical profession and the public. It is said also to have proved useful in the treatment of cholera.

[In the United States, it is said to be largely used for the adulteration of ground spices.]

D. H.

GLYCEROLE OF ALOES.

This preparation was originally introduced by M. Chausit, and subsequently by the General Apothecaries' Company, to the notice of the profession. Thinking it possible and probable that some of the readers of the *Pharmaceutical Journal* might meet with or be questioned concerning it, without having any certain or definite acquaintance with it, I beg to offer the following brief account. Glycerole of Aloes, according to M. Chausit, is prepared by dissolving an alcoholic extract of aloes in glycerine. Upon this information, I have prepared some according to the following forms; the proportions are my own, not having any given with the account of the preparation:—

Take of Socotrine Aloes, coarsely powdered and free from dirt, ʒiv.
Rectified Spirit of Wine, ℥iv.

Macerate until the aloes is dissolved, then filter through bibulous paper; distil the spirit as closely as may be, evaporate what remains to the consistence of treacle, and whilst still warm add sufficient pure glycerine to make four fluid ounces. Now, as the whole of the aloes, with the exception of a very small quantity of extraneous matter, was dissolved by the spirit and eventually mixed with the glycerine, reasoning from what I had already experienced with regard to the solvent power of that substance, I thought that it would possibly *alone* accomplish all that had already been done—that is, the solution of the aloes—but without the assistance of the spirit, and thus avoid a certain waste of material, loss of time, and needless labour. I therefore tried the following experiment:—

Take of Socotrine Aloes, in fine powder, ʒiv.
Pure Glycerine, ℥iv.

Mix them well in a mortar, then transfer to a bottle; agitate occasionally during several days, when, should the whole of the aloes not be dissolved, digest for fifteen minutes with gentle heat by means of a water-bath, when it will become dissolved, and may now be strained through linen to separate any small portions of dirt which may by any possibility be present. The result will be a preparation exactly similar to the preceding one, minus a very small quantity of spirit. Following either of these forms, only employing a larger proportion of aloes, a very similar article may be produced from the resin of aloes, which is obtained as a useless residue in preparing the aqueous extract of aloes. This glycerole of aloes is a bright mahogany-coloured liquid, of the consistence of Price's best and pure glycerine, and has been recommended by M. Chausit in the treatment of *lichen agrius* as an external application, also to the excoriations from *eczema*. It should be applied with a camel's hair brush.

18, *Conduit Street*, 15*th November*, 1859. A. F. Haselden.

ADULTERATED NITRATE OF SILVER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—An adulterated nitrate of silver has just come into my hands, of which it may not be useless to give a brief description :—

It was supplied by a London house, and is invoiced at 4*s.* per ounce.

It is wrapped in blue-tinted writing paper; is of a yellowish colour; less translucent than the pure article, and presents a dull, close-grained fracture; the crystalline structure being very indistinct.

Altogether, it appears in such a "questionable shape," as at once to rouse suspicion.

The pure salt yields about 63 per cent. of silver, but I found this sample to give little more than 55 per cent. The substance with which it is adulterated is nitrate of lead. A trace of iron is also present, which may account for its colour.

The proportions are *nearly*—

Nitrate of Silver	88
Nitrate of Lead	12
Iron, trace	
	100

With cold distilled water it gives a turbid solution, owing probably to the presence of a difficultly soluble compound of lead, formed during fusion by decomposition of a small portion of the lead nitrate.

I enclose a specimen for your inspection, and if you think the matter worth the notice of your readers, pray insert this note in your Journal.

Sheffield. T. Miller.

CULTIVATION OF MEDICINAL PLANTS AT HITCHIN, HERTS.

(*Continued from p.* 279.)

2. WILD OR SQUIRTING CUCUMBER.

Till within the last few years the cultivation of the wild or squirting cucumber (*Ecbalium officinarum* Rich., *Momordica elaterium* Linn.) was almost entirely confined to Mitcham, in Surrey, and Ampthill, in Bedfordshire. Its cultivation is, we believe, given up at the latter place, at least for commercial purposes; for, upon making inquiries there, we can obtain no information respecting it. At Hitchin, however, it is now cultivated to some extent by Mr. Ransom, Pharmaceutical Chemist, of that town. We may conclude, therefore, that Mitcham and Hitchin are at the present time the only districts in which it is grown for commercial purposes. Its cultivation at the former place has already been described in this Journal (vol. x., p. 168); we propose now to allude to it at the latter.

At Hitchin, the plants are either raised from seeds or by division of the roots. When raised from seeds, these are sown in the spring, usually about the end of March or early in April; the seedlings are then allowed to remain in the ground where they have sprung up, the soil having been previously highly manured with stable manure. A large number of plants are always self-sown. (The practice thus adopted at Hitchin is, in some respects, different from that carried out at Mitcham, for here it is customary to sow the ground about March, and to plant out the seedlings about June.—*Pharm. Journ.*, vol. x., p. 168.) When the plants are raised by dividing the roots, this operation is performed in the spring, the plants employed for the purpose having remained in the ground during the preceding winter, at which season they are protected from the frost by being covered with manure and mould. As it is found that the slightest frost destroys the plants, it is necessary to be very careful in thus protecting them from its influence. The plants thus raised by dividing the roots are afterwards planted out in ground highly manured, as in the plan of raising from seed. From the above facts it is clear, that the squirting cucumber, although an annual under

natural conditions, yet, by being protected during the winter, its existence may be prolonged beyond a year—indeed, we have seen plants which we have been informed were more than three years old. Hence, an annual plant thus becomes a perennial. Mr. Arthur, of Mitcham, has also observed "that if the roots be covered up during the winter, the plants survive through several seasons; and he has now some which have lived three or four years." The fruits which are borne by plants more than two years of age, are, however, much smaller, and their yield of elaterium less than those of younger plants; hence it is not customary to grow plants for commercial purposes beyond the second year of their existence.

The plants grow most luxuriantly in a damp, loamy soil; but it is found that a too great development is unfavourable to the production of the fruit, which is the only serviceable part of the plant, because in all cases where the nutritive organs of a plant become highly developed, but little fruit is produced. Hence a moderately dry, loamy soil, which has been highly manured, is that best adapted for the growth of the squirting cucumber. We are informed that a hot, moderately rainy season is that in which the plants thrive best, and yield most elaterium.

The plants flower freely in July and August, and towards the end of the latter month, and the first two or three weeks in September, the fruits are gathered for the preparation of elaterium. It is necessary to gather the cucumbers as nearly ripe as possible, for otherwise they will yield but a very trifling amount of the best elaterium; but, in consequence of their being thus collected in a comparatively ripe condition, the produce of many is lost, from the peculiar and well-known tendency of the fruit to discharge its contents when but slightly touched as it approaches ripeness. The common name of squirting cucumber, as applied to this plant, is thus derived. This loss of the juice in the fields during the process of gathering the cucumbers much increases the cost of obtaining and preparing elaterium. It is customary to employ boys to gather the cucumbers, and they are obliged to be very careful in handling the plants for the purpose of doing so, as otherwise the fruit frequently discharges its contents, and if this should reach the eye or other sensitive parts, serious consequences might ensue from the irritation thus occasioned. To show the injurious effects that sometimes result from carelessness in handling the fruits, it may be stated that, about two years since, some of the boys employed in gathering them began to play, and whilst doing so one of them squirted the juice into another's eye, and the inflammation excited thereby was so great, that the sight was for some time almost lost, in fact, it was more than a twelvemonth before it was entirely restored.

All the cucumbers produced at Hitchin are employed there for the preparation of elaterium. The process adopted (at least so far as can be ascertained by us, for there are certain peculiarities connected with the mode of collecting and manipulating the elaterium which are kept secret) is as follows:—As the cucumbers are brought in from the field, they are at once washed to free them from adhering dirt and other foreign matters. This process of washing is, we are informed, always resorted to, but it becomes more necessary when the fruits are very dirty. Each cucumber is then cut lengthwise, so as to divide it into halves. This operation is usually performed by boys, and as the fruit is thus cut, the halves are received into glazed earthenware pans. The divided cucumbers are then placed as soon as possible in a hempen cloth, and the whole afterwards placed in a common screw-press. A moderate pressure is now employed to press out the contained juice, which is allowed to run into a glazed earthenware vessel placed ready for the purpose, and at the top of which a sieve is put, so that the expressed juice is strained as it runs from the press, and thus before any deposit can have taken place, which we regard as a very desirable mode of procedure. Mr. Ransom informs us that he is very careful not to have

much pressure exerted, for otherwise the elaterium is much deteriorated in quality, and as we have had an opportunity of seeing the cucumbers after having been submitted to pressure, we observed that they were but moderately crushed, and hence the pressure employed could not have been very great, or they would have been reduced to a more pulpy condition. The juice as it runs through the sieve is somewhat turbid, and of a greenish-yellow colour. When the pressure has been continued for a few minutes, and the juice all run out from the pressed cucumbers, it is poured into glazed earthenware jars, and allowed to stand for about twelve hours, by which time the whole of the elaterium will have been deposited in the form of a greenish, slightly yellow mass. (The time thus allowed for the deposition of the elaterium is much longer than that commonly adopted; thus, at Apothecaries' Hall about two hours are considered sufficient for the purpose, and at Mitcham the time allowed varies usually from three to four hours.) The supernatant liquor is then very carefully removed, and the deposit collected in a cloth. This deposit is then dried in a room heated by steam to a temperature of about 100° Fahrenheit, and the preparation of the elaterium is completed. The exact mode in which the supernatant liquor is removed and the deposit collected and dried, is a secret. In some places where elaterium is prepared, it is the custom to put aside the supernatant liquor and allow it to deposit again. The elaterium thus obtained is of a paler colour and inferior in strength to the former. No use is, however, made at Hitchin of this supernatant liquor, but it is thrown away after the first deposit has been obtained. In fact, the time allowed for the first deposition is so long, that it is not likely that any further deposit would take place.

The amount of elaterium obtained from a bushel or forty pounds of cucumbers, is about three drachms. This accords very nearly with the experience of others. Thus, Mr. Arthur, of Mitcham, states that one bushel of fruit will yield about half an ounce, and Dr. Clutterbuck says that he obtained from half a bushel "less than two drachms of elaterium." We may fairly conclude, therefore, that half an ounce of good elaterium per bushel is about the ordinary yield, and that if a larger quantity be obtained, as is sometimes the case, that the excess is probably due to the use of too much pressure, and the resulting elaterium of inferior quality. We are informed, however, that the quantity of elaterium that can be obtained varies somewhat according to the weather in which the fruit is collected; thus, when the cucumbers are gathered in wet cool days, the yield is less than when they are obtained on a hot dry day.

The elaterium thus prepared at Hitchin is all sold to the Wholesale Druggists. We believe that much of the elaterium prepared in this country is not used here, but that a great proportion is exported to America and the Continent, where it is much more frequently employed as a medicinal agent. We think it probable that elaterium would be much more employed as a medicine in this country could it be always obtained of uniform strength; but on account of the various modes employed for preparing it, and the adulterations to which it is liable, this is far from being the case; and with such a powerful medicinal substance as it undoubtedly is, such a want of uniformity frequently leads to serious consequences. We consider it, therefore, very desirable to publish the processes of those who prepare good elaterium.

The elaterium, as thus prepared, is of a pale green colour, with a slight yellowish tinge which becomes more apparent by keeping. It is in light, thin, slightly-curved pieces, which break readily and with a short fracture. It is readily reduced to powder when rubbed between the thumb and forefinger, thus proving the absence of any mucilaginous matter. It has a somewhat fragrant and agreeable odour, which is quite of a peculiar nature, for it does not recal any other substance to us, although by some writers on materia medica the odour of elaterium has been compared to that of ergot of rye combined with the fragrance of senna or tea.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

The Action of Lime on Cellular Tissue.—In the account which was given,* a short time back, of M. Fremy's experiments on the composition of vegetable cell walls, it was stated that M. Fremy had obtained a new acid by the action of lime on the pulp of fruits or roots, which he termed *cellulic acid*. The composition and properties of this body were not, at that time, determined; M. Fremy has therefore presented to the French Academy the results of its examination in a separate paper. He states that it is only those utricular membranes containing *pectose* which are capable of yielding this acid, when treated with lime; and that when the pectose is converted into *pectine* or *pectic acid*, the salt is not obtained. The acid is best prepared from the pulp of beetroots, which is rich in pectose; the pulp is washed with distilled water, boiled in milk of lime for an hour, and then pressed, the liquor is evaporated to the consistence of a syrup and mixed with alcohol, which precipitates the lime salt. This compound is decomposed by oxalic acid, the crude acid so obtained neutralized by ammonia and solution of the neutral acetate of lead added, which precipitates traces of colouring matter, phosphoric acid, &c. To the filtered liquid ammonia is added, which throws down a voluminous white precipitate; this, decomposed by sulphuretted hydrogen, gives the acid in a state of purity.

This body presents the following properties:—It is soluble in water in all proportions, its taste is distinctly acid, it decomposes all the carbonates, saturating the most powerful bases; the salts which it forms with the alkalies are not precipitated by solutions of lime, baryta, strontia, copper, &c. It reduces by heat the salts of silver and the reagent of Frommherz; it produces in solutions of the neutral and of the basic acetates of lead precipitates which are soluble in excess of the reagent. From these characters M. Fremy recognized that the acid which he had thus obtained, and which he had at first named *cellulic acid*, was identical with another body originally described by him under the name of *metapectic acid*. The elementary composition and saturating power confirmed this identity; the formula of this body being $C_8\ H_5\ O_7\ 2HO$.

The acid which is formed by the action of lime on the pulp of fruits, &c., is, then, a derivative of pectine; it is the last term of the series of vegetable gelatinous bodies. Until now, metapectic acid, which, by the simplicity of its composition and general properties may be compared to lactic, malic, or citric acids, could only be obtained with difficulty, and by prolonged action, from pectine or pectic acid; but by these experiments it appears that it may be readily and at once procured from pectose.

These rapid modifications of the pectic compounds suggested to M. Fremy the idea that probably the disappearance of the gelatinous principles which exist up to a certain period in the vegetable tissues, may be due to the transformation of the pectose into metapectates, and that, consequently, considerable quantities of these salts exist in the vegetable juices. Analysis confirmed this view; the presence of the alkaline or calcareous metapectates was detected in all the liquids in contact with the tissues containing pectose.

On the Composition of the Crystalline Hydrates of Baryta and Strontia.—The composition of these bodies are differently represented by different authors, Professor Bloxam, therefore, has submitted them to analysis for the purpose of deciding the discrepancy. He prepared the hydrates by the process of Dr. Mohr, which consists in adding an excess of caustic soda to a solution of nitrate of baryta. The crystals of hydrate of baryta so obtained were found to contain nine atoms of water, of which seven atoms were lost when the crystals were allowed to effloresce in a vacuum; another atom was driven off by a red heat, and one atom retained at all temperatures. The composition of the effloresced hydrate, therefore, may be represented as $BaO,\ HO+HO$, and the crystals as $BaO,\ HO+HO+7$ Aq. The efflorcsced hydrate furnished heat when thrown into water.

The strontia compound contained the same number of atoms of water, but, con-

* See "Report," p. 117, of *Pharmaceutical Journal* for August.

trary to the usual statement, it lost the whole, and was consequently rendered anhydrous, at a red heat.

Combinations of Mannite with Lime, Baryta, and Strontia.—M. J. Ubaldini has published the results of some experiments on the composition of the compounds which mannite forms with the alkaline earths.* If a mixture of 200 parts of mannite, 66 parts of slaked lime, and 660 parts of water be introduced into a well stoppered bottle and shaken from time to time for a couple of days, a solution is obtained in which the mannite and lime are present in about equal equivalents. If this liquid is treated with three or four times its volume of alcohol, a white flaky deposit immediately takes place, which collects and adheres strongly to the bottom of the vessel, and which consists of the compound of mannite and lime. This body may be further purified by solution in water and reprecipitation with spirit. This substance, which may be thus obtained pure and perfectly definite when dried at 120° C. in air freed from carbonic acid, has the composition CaO, $C_6 H_7 O_6$ dried in the cold over sulphuric acid it retains two atoms of water.

The hydrated compound dissolves easily in its own volume of water. This limpid syrupy solution solidies by heat in the same way as saccharate of lime. The coagulation commences at 85° C., and at 90° C. the vessel may be reversed without anything running out. As the temperature decreases the mass becomes fluid again. If, instead of precipitating the original solution with spirit, it is evaporated under a receiver with oil of vitriol, fine crystals of mannite, retaining 5.3 per cent. of lime, are obtained. If the supernatant liquid from these crystals be poured off and abandoned for some weeks, a white crystalline substance deposits, which has the composition CaO, $2C_6 H_7 O_6$ when dried at 120° C.

Another compound may also be obtained by gradually heating the original solution of mannite and lime, and which probably has the composition $C_6 H_7 O_6$, 3 CaO. By simply exposing the solution of mannitate of lime to the air, crystals of carbonate of lime are obtained, CaO, Co_2 5 HO.

The compound of mannite and baryta is obtained in the same manner as the preceding, substituting baryta for lime. On the addition of the alcohol an extremely dense syrupy liquid collects at the bottom of the vessel; by repeated solutions in water and precipitations with alcohol, this substance may be obtained in a state of purity. Dried at 160° C., in air freed from carbonic acid, it has the composition 2 BaO, $C_6 H_7 O_6$. Dried over oil of vitriol it retains 5 atoms of water. This baryta compound, in the hydrated state as precipitated by alcohol, when dried over the water-bath becomes completely transparent, although so viscid that it will not run out of the tube; heated above 100° C., it swells out to four or five times its original volume, and when cool again cracks like glass, which it much resembles. Its concentrated solution also coagulates between 50 and 60° C. in the same manner as white of egg.

The strontia compound resembles in appearance and properties the preceding, but differs in composition. Its formula is SrO, 2 ($C_6 H_7 O_6$) with 8HO when in the hydrated condition.

On the Action of Sulphurous Acid on Persalts of Iron.—When one equivalent of pure and chemically-neutral perchloride of iron is treated with one equivalent of sulphite of soda in solution, the liquid acquires a very deep blood-red colour, which, however, is only transitory and soon disappears, at the same time that the persalt of iron is reduced to a proto-salt. M. Buignet† has shown that if, before adding the alkaline sulphite, the perchloride be mixed with a quantity of hydrochloric acid, the coloration is less marked, and the reduction is not completely effected. The proportion of perchloride which escapes reduction being in proportion to the quantity of acid added. The influence exercised by the hydrochloric acid is such, that when it is present in the proportion of ten equivalents, that is to say, of twenty-five cubic centimetres to one gramme of iron in the state of perchloride, the reaction obtained is little more than one-fourth what it should be. Although this result only applies to such concentrated solutions, yet it may be important in certain cases, as in the assay of iron by the process of Margueritte, because it shows the necessity of diluting the solutions or neutralizing the free acid. M. Buignet con-

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* *Annales de Chimie et de Physique*, Oct. 1859.

† *Comptes Rendus*, Oct. 24th, 1859.

siders that the deep red colour, referred to above, is due to the formation of a sulphite of peroxide of iron, $Fe_2 O_3 3SO_2$. He states that the same phenomena of successive coloration and decoloration is produced by the action of solution of sulphurous acid on hydrated peroxide of iron. That on mixing the perchloride and alkaline sulphite at the temperature of an ice bath, by which a little more stability is given to the red compound, the mixture contains neither sulphuric acid nor protoxide of iron. That the sulphite of peroxide of iron, which is formed by the direct union of sulphurous acid and hydrated peroxide of iron, loses spontaneously its red colour, and is reduced to a mixture of equal equivalents of sulphate and sulphite of protoxide of iron, with one equivalent of sulphurous acid free.

$$Fe_2 O_3, 3SO_2 = FeO, SO_3, + FeO, So_2 + So_2.$$

On Writing Ink.—Mr. Starck has been engaged in some experiments on the manufacture of writing ink.

The author recommends the addition of sulphate of indigo to good ink, prepared from commercial sulphate of iron and nutgalls for the purpose of increasing the stability of its colour. He states that no source of tannin can be used with such advantage as good nutgalls, and that the addition of a persalt of iron, although it deepens the colour yet diminishes its durability. The following are the proportions recommended:—Nutgalls 375 parts, sulphate of indigo 250, green copperas 250, gum arabic 180, cloves 2, and water sufficient to make 2000 parts of ink. This liquid flows freely from the pen, does not clog, and dries upon the paper of a fine permanent black.

Metallic Cement.—M. Greshiem states that an alloy of copper and mercury, prepared as follows, is capable of attaching itself firmly to the surfaces of metal, glass, and porcelain. From 20 to 30 parts of finely divided copper, obtained by the reduction of oxide of copper with hydrogen, or by precipitation from solution of its sulphate with zinc, are made into a paste with oil of vitriol and 70 parts of mercury added, the whole being well triturated. When the amalgamation is complete, the acid is removed by washing with boiling water, and the compound allowed to cool. In ten or twelve hours it becomes sufficiently hard to receive a brilliant polish, and to scratch the surface of tin or gold. By heat it assumes the consistence of wax, and, as it does not contract on cooling, M. Greshiem recommends its use by dentists for stopping teeth.

DEODORIZATION OF SEWAGE.

The following report has been addressed by Dr. Hofmann, F.R.S., and Dr. Frankland, F.R.S., to the Metropolitan Board of Works:—

Having been requested by a resolution of your Board, bearing date the 27th day of May, 1859, to undertake the duty of advising the Board as to the selection, from various schemes proposed for the deodorization of sewage, of a process combining both efficiency and economy, we now beg leave to report to you the result of a minute inquiry into this subject.

In conducting our investigation, we have carefully kept in view the final plan of dealing with the sewage adopted by the Board, the principal features of which were lucidly described to us in a letter from your chief engineer.

Not the least arduous part of our labours consisted in the careful examination of the numerous, and in many cases ponderous, documents addressed to the Board on this subject, and transmitted to us for consideration.

This examination led us to the conclusion that a comparatively very small number only of these proposals admit of application in conformity with the plan of dealing with the sewage finally adopted by the Board.

The comparatively small number admitting of such application, experienced a further limitation when the several processes were submitted to experimental trial. In fact, of all the proposals, old and new, referred to us, there is only one which appears to satisfy in the necessary degree the conditions involved in the circumstances of the case.

The agent to which we allude is that described as "Dales' Muriate of Iron," essentially a concentrated solution of perchloride of iron, the disinfectant properties of which were some years ago pointed out by Mr. Ellerman. This we have submitted to an extensive series of comparative trials with the well-known disinfectants, lime

and chloride of lime, which, probably owing to their long-established character, are not included in the proposals before us.

These trials lead to the conclusion that the deodorization of sewage may be effected either by the perchloride of iron, chloride of lime, or lime; but that, if quantities of equal value* be applied, the perchloride of iron is markedly superior to either of the others, whilst chloride of lime acts much more powerfully than lime.

These statements refer both to the immediate action of the three agents upon sewage, and to the permanency of the effect produced; but when examined from the latter point of view, the superiority of the perchloride of iron is exhibited even in a still more marked degree.

It may be stated that these results were obtained by operating upon sewage, such as flows from the mouths of the chief metropolitan sewers during the hottest season of the year, our experiments having been performed during the latter half of the month of July.

Since the calculations as to the cost of deodorization are based upon these experiments, it may not be out of place here to mention briefly the mode in which they were conducted. In order to enable us to operate upon a sufficiently large scale, brickwork tanks, lined with cement, and holding 7500 gallons each, were constructed at the outfall of the King's Scholars' Pond Sewer. The sewage was lifted into these tanks by means of a steam pump, and the various deodorizing agents were incorporated, either by their gradual introduction into the shoots during the process of filling, or by diffusing them through the mass of the liquid by means of mechanical agitation.

From a number of experiments thus conducted, it appears that each of the three agents above mentioned will effect the immediate deodorization of 7500 gallons of sewage when applied in the following proportions:—

Perchloride of iron	$\frac{1}{2}$ gallon
Chloride of lime	3 lbs.
Lime	1 bushel

From these results it follows that 1,000,000 gallons of sewage require respectively —

	£	*s.*	*d.*
66 gallons of perchloride of iron, costing	1	13	3
400 lbs. of chloride of lime	2	2	$10\frac{1}{2}$
$132\frac{1}{2}$ bushels of lime	3	6	6

During the performance of these experiments, which, as already stated, were made during the hottest portion of a dry season, we were surprised to find that the liquid flowing from the outfall of the sewer was by no means strongly offensive; it was only after preservation in tanks for twenty-four hours, or upwards, that a really powerful odour manifested itself. This circumstance rendered it of the highest importance to inquire more closely into the degree of permanency of the effect produced by the several agents under consideration.

For this purpose, three equal quantities of sewage were collected, and perfectly deodorized respectively by perchloride of iron, chloride of lime, and lime: they were then allowed to stand. After two days, the sewage disinfected by lime became slightly tainted, whilst that deodorized by chloride of lime and perchloride of iron remained perfectly odourless. At the end of three days, the limed sewage had become decidedly offensive, whilst the other two specimens still remained free from smell. After four days, the odour of the limed sewage had become worse, but that treated with chloride of lime likewise began to exhibit an offensive character, whilst the sewage to which perchloride of iron had been added remained perfectly inodorous.

* We have endeavoured to arrive at the average price of these three agents. It appears that they are subject to considerable fluctuation. As the average result of our inquiries, we have taken the value of lime at 9*s.* per cubic yard = 18 bushels; the value of chloride of lime of 36 per cent. (about the strength of that used in our experiments), at £12 per ton; and that of the perchloride of iron solution, specific gravity 1.45, at 6*d.* per gallon. Probably these prices would be subject to a certain amount of reduction if very large quantities were consumed. We should state further, that the estimation of the value of perchloride of iron is founded upon our knowledge of the price of its ingredients and the cost of manufacture, although Messrs. Ellerman and Dales, who have proposed this liquid, quote 1*s.* 6*d.* as their maximum price per gallon.

Even after the lapse of nine days, the condition of the latter had not changed. In other experiments the same relative permanency of effect has been observed.

Another important element in estimating the comparative fitness of an agent for the treatment of sewage, is, the time required for clarification after the addition of the disinfectant. In this respect, also, the results of the preceding experiments lead us to give a decided preference to perchloride of iron.

It now remains to apply the results thus obtained to the circumstances of the case before us. From the statements in Mr. Bazalgette's letter, it appears, that it is at present contemplated to collect the larger proportion of sewage in two reservoirs, to be constructed respectively at Barking Creek and Crossness Point, in which it would be allowed to settle for about nine hours and a half, in order to be discharged into the river during the first two hours and a half of the ebb tide. The third portion of sewage, we learn from Mr. Bazalgette's letter, will be pumped into the river all the year round at a point near Cremorne Gardens, termed the outfall for the Western Division. The subjoined table gives the quantities of sewage discharged at present daily, according to Mr. Bazalgette's estimate, and likewise the quantities anticipated in future years.

	Present.	Prospective.
Discharge of Sewage at Barking Creek	56,536,875	62,500,000
Do. Crossness Point.....	20,066,250	35,937,500
Do. The outfall of Western Division...	4,646,875	9,375,000
Total	81,250,000	107,812,500

The sewage discharged at Barking Creek and Crossness Point would probably not require deodorization, except during the hot season of the year—say during three months. Supposing the deodorization to be effected by perchloride of iron, the disinfection of this portion of the sewage at the present rate of flow would involve an expenditure of £11,620 13*s.* 9*d.* for the three months. We are, however, of opinion, that in practice the sewage discharged into the river at this distance from the metropolis would rarely require deodorization for so long a period as three months. In fact, we are not without hope that the sewage, supposing it to arrive at these outfalls in a condition similar to that in which it is at present discharged from the King's Scholars' Pond Sewer, would, when properly freed from suspended matter, only require deodorization under particularly unfavourable circumstances.

With regard to the sewage discharged at the outfall of the Western Division, it will be indispensable to submit it to a systematic deodorization the whole year round. Owing to the comparatively small fraction of the sewage delivered at this point, a very moderate sum would cover the expense—£2821 3*s.* 0*d.* being the cost of the disinfectant for the year.

Having thus stated the results of our experiments regarding the process of deodorization, it remains only to draw particular attention to the importance of discharging the sewage into the river as free from mechanically-suspended matter as possible. We have found that this suspended matter, when separated even from the deodorized sewage, rapidly passes in warm weather into a state of active putrefaction. The removal of this matter would, in a great measure, prevent the formation of any offensive deposit upon the banks of the Thames, not to speak of the improvement in the appearance of the river which would thus be secured. We are therefore of opinion that filtration should be invariably employed at the outfall of the Western Division, and that subsidence, if not actual filtration, should be resorted to at the two remaining outfalls.

The putrefactive tendency of the deposit separated by filtration or subsidence renders its rapid removal from the reservoirs or filters a matter of the utmost importance, especially during summer; for the process of putrefaction, when once commenced, can be arrested only by quantities of disinfectants practically impossible.

It is not within our province to enter into details respecting the mechanical arrangements necessary for the application of the disinfectant, or for the filtration and subsidence of the sewage; but we beg to express our opinion, based upon the

experience acquired during this investigation, in manipulating with comparatively large quantities, that the disinfection of vast volumes of sewage can be more easily accomplished than is generally believed, and than we ourselves anticipated at the commencement of our inquiry. The actual process of deodorization will probably present less difficulty than the mechanical separation of the deposit by filtration or subsidence. This separation will involve the temporary storage of immense quantities of sewage, the rapid removal of large quantities of deposit, and a number of operations which can be successfully carried out only with considerable system and under strict inspection. Operations of this kind should be as far as possible conducted at a distance from densely populated districts; and we consider it therefore a happy feature of the scheme adopted by the Board, that a small fraction only of the total amount of sewage requires to be manipulated in the immediate neighbourhood of London.

(Signed) A. W. HOFMANN,
London, August, 1859. E. FRANKLAND.

ON A NEW MODE OF BREAD MAKING.

BY WM. ODLING, M.D., F.R.S.

The following paper was read before the Chemical Section of the British Association, at Aberdeen:—

I wish to introduce to the notice of this Section of the Association a new mode of making bread, invented by Dr. Dauglish, and now practised on a somewhat large scale in London. The process is one of considerable interest, not only in a chemical, but in a manufacturing and a sanitary point of view.

The vesicular character of ordinary bread, results, as is well known, from the development of carbonic acid gas uniformly throughout a mass of fermenting dough, whereby a loose, spongy texture is imparted to what would otherwise be a dense sodden lump of baked flour and water.

In fermented bread, the carbonic acid gas thus generated, within the substance of the dough, is a product of the transformation, or degradation of one of the constituents of the flour, namely, of the starch or sugar. In the plan I am about to describe, the carbonic acid gas is produced independently and superadded to the flour, which consequently need not undergo any degradation whatever.

The following description furnishes a general outline of the process:—Carbonic acid gas, stored in an ordinary gas-holder, is pumped therefrom into a cylindrical vessel of water, whereby the water becomes charged with the gas. This carbonic acid water is mixed, under pressure, with the flour, and the resulting dough, which becomes vesicular on the removal of the pressure, divided into loaves and baked.

At present, the carbonic acid gas is produced in the manner usually employed by soda-water makers. A mixture of chalk and water is run into a large wooden tub, in which an agitator constantly revolves by means of an endless band, driven by a steam engine. Sulphuric acid, flowing through a leaden pipe, closed at the bottom by a leaden cup of acid, which acts as a valve, is constantly dropping, by the overflow of the cup, into the mixture of chalk and water: and the carbonic acid gas thus generated passes at once into an ordinary gas-holder having a capacity of 1000 cubic feet, where it is stored for use. But a different mode of producing the carbonic acid has been tried with success, and is now about to be employed. This process consists in the ignition of chalk, and is interesting as being opposed to our ordinary chemical notions of the circumstances under which chalk can be made to part with its carbonic acid. The chalk is heated for three or four hours in five small iron retorts resembling gas retorts. The first portion of gas, being constituted largely of air and steam, is allowed to escape ; the remainder passes at once into the gas-holder. By this means a large supply of pure carbonic acid is obtained very cheaply. The lime remaining in the retorts, though not absolutely caustic, is very nearly so, and slacks readily with water.

From the gas-holder, the carbonic acid gas is usually pumped direct into the water-vessel, but sometimes into a separate reservoir of condensed gas, which then enters the water-vessel by its own elasticity. The pair of pumps are arranged to work under

a pressure of 200lb. on the square inch. Any additional pressure opens a valve through which the gas re-passes into the gas-holder. The pumps are worked in a cistern of water, and the pipes leading from the pumps are encased in a sort of Liebig's condensing apparatus, whereby the great heat generated by the condensation of the gas is effectually withdrawn.

The water-vessel is a closed cylinder of copper, with hemispherical ends, tinned on the inside, about five feet high, and a foot in diameter. Its upper extremity communicates, by means of a cock, with a cistern of water placed directly above it, and by means of another cock, with a pipe leading into the upper part of the mixing or doughing-vessel. This mixer is a hollow sphere of cast-iron, about three feet in diameter, having a rotating horizontal axis, to which the mixing arms or forks are attached. Its upper part communicates, by a pipe, with the upper part of the water cylinder, and its lower part, by another pipe, with the lower part of the cylinder. It is furnished with two circular openings, somewhat less than a foot in diameter, one at top, one at bottom. The lids which close these openings of the mixer have each a circular rim or projection fitting into a corresponding circular groove or depression, lined with vulcanite ; and the apposition is rendered pressure-tight by means of a screw. The exact mode in which these lids are adapted varies somewhat in the different mixers.

In order to make bread, a definite quantity of water—about 20 gallons—is run into the water-cylinder, so as to about three parts fill it, the quantity admitted being read off upon a lateral gauge. The bottom lid of the mixer having been properly attached, the cloth nozzle of a shoot is introduced into the upper opening, through which a sack of flour and three or four pounds of salt are passed, from an upper story, into the mixer. The cloth nozzle is then removed, and the upper lid properly closed. The closed mixer being then in communication with the closed water-vessel by the upper pipe, an exhausting pump connected directly with the mixer is set to work, and so rapidly and completely is the exhaustion of air from the interior of these two vessels effected, that in the course of two minutes a vacuum of 29 or 30 inches is produced. The object of this preliminary exhaustion is simply to prevent any admixture of air with the carbonic acid subsequently introduced, inasmuch as a great portion of this latter has to be used over and over again. The necessary vacuum having been obtained, carbonic acid gas is admitted, either directly from the forcing pump, or from the intermediate reservoir of condensed gas. The carbonic acid first enters the cylinder at the bottom of the contained column of water, passes through the water to the top of the cylinder, and thence into the mixer, an arrangement which promotes the thorough saturation of the water. Moreover, the gas is admitted through a rose furnished with a few minute openings only, whereby it does not pass through the water in mass, but is distributed equally throughout. The pumps are continued in action until the pressure in the two vessels has reached 100 lbs. on the square inch. Then, on turning a cock at the bottom of the cylinder, which is on a higher level than the top of the mixer, the water runs from the cylinder into the mixer by its own gravity. The kneading axis, with its arms, is next set going. The process of kneading differs from ordinary machine kneading in one important particular. The substance kneaded is not a tough vesicular mass of fermenting sponge and flour and water, difficult to incorporate, but a non-vesicular mass of flour and water only. This kneading is continued for a period varying from three to ten minutes. As a rule, the less the kneading of the flour, the whiter and more perfect the bread, but with some descriptions of flour the kneading must be continued for about ten minutes, in order to develop the elastic and tenacious characters of the gluten sufficiently to retain the carbonic acid, although with good flour, three or four minutes are generally sufficient. After the kneading is completed, the dough is forced out from the mixer by the elasticity of the contained carbonic acid.

The exit for the dough is of somewhat peculiar construction. In the bottom lid of the mixer, shielded by internal buttons to prevent the direct pressure of the gas, are two rectangular slits, each two inches long and a quarter of an inch wide. From these proceed two flat tin pipes, which gradually increase in size, trumpet-like, until they meet together, when they unite to form one circular nozzle, about 4 inches in diameter. The object of this contrivance is to prevent any sudden expansion of the dough as it becomes freed from the pressure in the mixer. Thus the section of dough, as it escapes from the mixer, occupies an area of one square inch only. It then

passes through the gradually expanding trumpet pipe until its sectional area becomes equal to about 12 square inches, after which it is allowed to expand freely. The boy in charge of this exit for the dough has at his disposal a cut valve, by which the issue of the dough through the pipe is stopped or permitted. He receives the dough in a succession of tins or French moulding baskets, and, by a little practice, is able to cut off from the continuous stream of dough, into each tin or basket, a quantity weighing about 2 lbs 4 oz. The tins with the dough in them are placed at once on the floor of the oven. The dough in the baskets is emptied on to wooden peels, and thence slid upon the oven bottom. This oven is what is termed a travelling oven. The bottom constitutes part of an endless chain revolving on two drums, by which the speed of its travelling can be regulated. The loaves enter at one extremity of the oven and are ejected at the other, being baked during their transit.

The advantages of the new process are,—1st. Its cleanliness. Instead of the dough being mixed with naked arms or feet, the bread, from the wetting of the flour to the completion of the baking, is not, and scarcely can be, touched by any one. 2nd. Its rapidity. An hour and a half serves for the entire conversion of a sack of flour into baked loaves; whereas, in the ordinary process, four or five hours are occupied in the formation of the sponge, and a further time in the kneading, raising, and baking of the dough. 3rd. Its preventing deterioration of the flour. In making fermented bread from certain varieties of flour, not in themselves unwholesome, the prolonged action of warmth and moisture induces a change of the starchy matter of the flour into dextrine, whereby the bread becomes sodden and dark coloured. This change is usually prevented by the addition of alum, which is, indeed, an almost necessary ingredient in the manufacture of bread from glucogenic flour. But in operating by the new process, there is no time for glucogenic change to take place, and consequently no advantage in the use of alum, even with any description of flour. 4th. Its certainty and uniformity. Owing to differences in the character and rapidity of the fermentation, dependent on variations of temperature, quality of yeast, &c., the manufacture of fermented bread frequently presents certain vagaries and irregularities from which the new process is entirely free. 5th. The character of the bread. Chemical analysis shows that the flour has undergone less deterioration in bread made by the new, than in that made by the fermented process. In other words, the per centage of extractive matters is smaller. The new bread has been tried dietetically at Guy's Hospital and by many London physicians, and has been highly approved of. It is well known that for some years past, the use of fermented bread, in dyspeptic cases, has been objected to by members of the medical profession, the débris of the yeast being considered unwholesome, and liable to induce acidity. 6th. Its economy. The cost of carbonic acid is alleged to be less than the cost of yeast. Moreover, in making fermented bread there is a small, but necessary waste, of the saccharine constituents, which is avoided in the new process. 7th. The saving of labour and health. It substitutes machine labour for manual labour of a very exhausting kind. The sanitary condition of journeymen bakers was investigated some time ago by Dr. Guy, and found to be most lamentable, from their constant night work, and from the fatiguing and unwholesome character of their labour, particularly the kneading. In a politico-economical point of view, the process is as important as removing bread-making from a domestic manual work to a manufacturing machine-work. From the character of the apparatus, the process can only be used profitably on a large scale, and not in small bakeries.

CANOUIL'S PROCESSES FOR MANUFACTURING CHEMICAL MATCHES WITHOUT PHOSPHORUS AND CONTAINING NO POISONOUS SUBSTANCE.

1. *Mass without Phosphorus for Sulphured Matches.*

The matches without phosphorus, manufactured in Paris by Canouil, are ignited by rubbing upon any hard body, whether it be rough or smooth, supposing the surface against which they are rubbed to present a certain amount of resistance.

Neither a blow, nor a shock, nor a temperature of 356° F., are capable of igniting these matches; their combustion is only caused by friction.

As the mass contains no phosphorus, their manufacture presents no danger for the workpeople, as they neither cause explosions nor injurious emanations. The mass of these matches, which were patented in France in March, 1857, contains the following substances:—

Dextrine	10 parts.
Chlorate of potash	75 "
Brown oxide of lead	35 "
Iron pyrites	35 "
Water, the quantity necessary to form a uniform paste.	

The chlorate of potash, the oxide of lead, and iron pyrites are separately powdered and then made into a paste by means of the solution of dextrine; into this the ends of the sulphured matches are dipped in the usual way.

The dextrine might be replaced by gum or glue, and the iron pyrites by other metallic sulphurets, to some of which, however, it is preferable, as not being poisonous.

2. *Safety-matches with a peculiarly prepared Friction-surface.*

A second patent of Canouil's, dated October 7, 1857, relates to safety-matches of wood, wax, paper, German tinder, &c., which ignite only at a particular surface, containing no phosphorus. The latter consists of a slip of wood, card, or metal, covered with a layer of the preparation, which causes the ignition of the chemical match by mere friction. Such matches may be sent anywhere without the least danger, as the matches and the friction-surfaces may be packed in separate boxes. The mass for the matches consists of—

Chlorate of potash	7 parts.
Acetate of lead	2 "
Bichromate of potash	2 "
Flowers of sulphur	1 "
Gum or dextrine	6 "
Water	18 "

The covering for the friction-surface consists of—

Iron scales	1 part.
Emery	1 "
Chlorate of potash	6 "
Minium	1 "
Size, a sufficient quantity to form a paste, which is applied to a slip of card, wood, or metal.	

The substances in both formulæ are made into paste, as described for the first matches.

3. *New Mass without Phosphorus for Sulphured Matches.*

In order to avoid the slight explosions which occur on the friction of the first matches, the discoverer now leaves the metallic sulphurets or the sulphur out of the composition. They are replaced by powdered glass or flint, which is mixed in various proportions with the chlorate of potash, according as it is desired to produce combustion with more or less ease by friction. Bichromate of potash is also added as an oxidizing body.

The new mass for sulphured matches consists of—

Chlorate of potash	5 parts.
Powdered glass or flint	3 "
Bichromate of potash	2 "
Gum or dextrine	2 "
Water	8 "

—*Dingler's Polytechn. Journal*, cli., p. 321, and *Chemical Gazette*.

ON THE FREEZING-POINT OF WATER IN CAPILLARY TUBES.

BY H. C. SORBY, F.R.S., &c.

Upwards of two years ago, when making some experiments in order to ascertain the true nature of the liquid contained in the fluid-cavities in quartz, I thought that its freezing-point was well worthy of being determined. Sir Humphry Davy had long before shown (*Philosophical Transactions*, 1822, p. 367) that in many cases this fluid was water; and I had myself proved to my own satisfaction that water is given off from the cavities when the crystal containing them is heated so that the expansion of the fluid bursts them; but I was anxious to confirm this conclusion by some independent experiment, and to prove that it was water whilst still in the cavities. I therefore kept for a sufficiently long time a portion of rock-crystal, containing very excellent and distinct fluid-cavities about $\frac{1}{000}$th of an inch in diameter, in a mixture of snow and salt at a temperature far below the freezing-point of water; and then quickly placing it in a saturated solution of common salt previously reduced to a very low temperature, I was much surprised to find that the liquid in the fluid-cavities had not been frozen, but the enclosed bubbles still moved about like those in spirit-levels, when the fragment was turned round, just as they did at first. I again repeated this experiment along with Dr. Tyndall; and we both came to the conclusion that the fluid would not freeze at a temperature nearly 20° C. below the freezing-point of water, or even lower than that of strong saline solution, and therefore there was some doubt as to whether it really could be water or some saline solution. I, however, had such confidence in the value of other independent proofs, that I still adhered to the idea of its being water, and that the phenomenon must be owing to some peculiarity in the freezing of water in minute cavities. I afterwards learnt that Dr. Percy had made some experiments with water in capillary tubes, and had arrived at a similar conclusion. He has not, I believe, published an account of these, but kindly told me all the particulars. In his experiments the water apparently did not freeze at all; but when in such minute tubes, it is difficult to ascertain for certain whether the water is frozen or not, if it be merely examined with an ordinary magnifying glass; and, therefore, thinking there might still be some doubt about this, I resolved to carefully investigate the whole subject.

Of course we all know very well that the temperature at which water will freeze is not necessarily that at which it thaws. It has long been known that the temperature may be reduced very considerably below 0° C. if no ice be present and the water be kept tranquil, freezing, however, when agitated. If the water be in a glass tube about one-fourth of an inch in diameter, the temperature can easily be lowered to —5° C. (23° F.), even when the tube is shaken; and if kept quiet, the temperature may be reduced somewhat more. At —6°, however, it freezes at once, even when kept perfectly quiet. The same takes place in tubes $\frac{1}{40}$th of an inch in diameter; but when much less than that, the result is very different.

To ascertain beyond all doubt whether the water in very minute tubes was liquid or in the state of ice, I had recourse to the aid of the microscope and polarized light. In using this, some care is required. The analyser should be so arranged as to have a perfectly dark field; and the plane of the polarization of the light should be either in the line of the length of the tube or at right angles to it; for, if not, the light is depolarized by the curving sides of the tube. When all is properly arranged, and the focus adjusted to the centre of the tube, if it contain liquid water the whole field appears dark, and no white line is to be seen down the centre of the tube; whereas, if the water be frozen, the double refraction of the ice depolarizes the light, and the tube appears as if it contained a white substance, which vanishes as the ice thaws. In order to delay the thawing, the small tube should be examined when inside a larger vessel containing a strong solution of common salt.

The capillary tubes used in my experiments were prepared by drawing out, when melted, the tubes used for alcohol thermometers; and their internal diameters were ascertained by measuring them at the broken ends by means of the microscope-micrometer, because the bore appeared about $\frac{3}{2}$ of the actual diameter when seen at the side through the curved glass. I made experiments with those whose diameters varied down to nearly $\frac{1}{1000}$th of an inch; but when so small as that, the depolarizing action of the ice is so weak, that it is impossible to be quite sure whether they con-

tain water or ice. Those, however, from $\frac{1}{200}$th to $\frac{1}{300}$th of an inch in internal diameter are in every respect most satisfactory; for there is no difficulty whatever in deciding this point with polarized light in the manner just described. When water is contained in such tubes, we can readily reduce the temperature to below —15° C. without using any care to keep them quiet; and even when we shake them very violently, it will not freeze. The temperature may even be reduced to —16° C. (3° F.) without taking any precaution to keep it still; but at —17° C. the water freezes at once, even when kept perfectly quiet. It will thus be perceived that there is a difference of about 11° C. (20° F.) between the temperature at which water freezes in tubes of about $\frac{1}{4}$th of an inch in diameter and in those less than $\frac{1}{200}$th, which is so great a difference that there is no chance of its being an error of observation.

So far as I was able to ascertain, there was no very decided difference in the temperature in the case of tubes varying from $\frac{1}{200}$th to $\frac{1}{700}$th of an inch in diameter, nor in the case of tubes from $\frac{1}{4}$th to $\frac{1}{40}$th; but in a tube of about $\frac{1}{100}$th the water froze at about —13° C., but not at 11°, which is clearly a temperature intermediate between that required for those of $\frac{1}{40}$th and $\frac{1}{200}$th. It must not, however, be supposed that water will not freeze in minute tubes at a temperature very little lower than 0° C., if the water be in contact with ice. When a tube of considerable diameter in one part is ever so fine in another, the contact of ice causes the water to freeze right down into the capillary part of the tube at a temperature very little lower than 0° C.; and ice thaws as usual at 0° C. when in tubes in which water will not freeze until the temperature has been reduced to —16° C.

It therefore appears to be completely proved that water will not freeze in tubes of very small internal diameter, even when they are shaken, at a temperature very considerably lower than that at which it freezes at once in larger tubes, even when kept perfectly still, as though the actual size exerted a most decided influence in preventing the crystallization of water, which freezing essentially is. In this respect water does not stand alone; for the same retarding action is exerted on the crystallization of salts from solution. This is well seen in the case of bichromate of potash; for in some cases, when in a very minute state of division inside the fluid cavities in other salts, a strong hot solution will not deposit any crystals on cooling, even after having been kept for upwards of a year, but remains as a deep yellow liquid, containing relatively far more of the bichromate in solution than can be retained when the liquid is in larger quantity. Small portions of lava have also often remained as an uncrystalline glass inside the minute cavities in the minerals of volcanic rocks, though it has entirely passed into a crystalline stone when in larger masses.—*The London, Edinburgh, and Dublin Philosophical Magazine.*

ON THE TRANSMISSION OF HEAT OF DIFFERENT QUALITIES THROUGH GASES OF DIFFERENT KINDS.

(*Substance of a Lecture delivered at the Royal Institution.*)

BY JOHN TYNDALL, ESQ., F.R.S.,
Professor of Natural Philosophy, Royal Institution.

Some analogies between sound and light were first pointed out: a spectrum from the electric light was thrown upon a screen—the spectrum was to the eye what an orchestra was to the ear—the different colours were analogous to notes of different pitch. But beyond the visible spectrum in both directions there were rays which excited no impression of light. Those at the red end excited heat, and the reason why they failed to excite light probably was that they never reached the retina at all. This followed from the experiments of Brücke and Knoblauch. These obscure rays had been discovered by Sir Wm. Herschel, and the speaker demonstrated their existence by placing a thermo-electric pile near to the red end of the spectrum, but still outside of it. The needle of a large galvanometer connected with the pile was deflected and came to rest in a position about 45 degrees from zero. A glass cell, containing the transparent vitreous humour of the eye of an ox, was now placed in the path of the rays: the *light* of the spectrum was not perceptibly diminished, but the needle of the galvanometer fell to zero, thus proving that the obscure rays of the spectrum, to which the galvanometric deflection was due, were wholly absorbed by the humours of the eye.

Reference was made to the excellent researches of Melloni. In a simple and ingenious manner he had proved the law of inverse squares to be true of radiant heat passing through air, and the eminent Italian inferred from his experiments that for a distance of 18 or 20 feet, the action of air upon radiant heat was totally inappreciable. This is the only experimental result now known regarding the transmission of radiant heat from terrestrial sources through air ; with regard to its transmission through other gases it was believed that we were without any information.

It was, however, very desirable to examine the action of such media—desirable on purely scientific grounds, and also on account of certain speculations which had been based upon the supposed deportment of the atmosphere as regards radiant heat. These speculations were originated by Fourier, but it was to M. Pouillet's celebrated Memoir, and the recent excellent paper of Mr. Hopkins, to which we were indebted for their chief development. It was supposed that the rays from the sun and fixed stars could reach the earth through the atmosphere more easily than the rays emanating from the earth could get back into space. This view required experimental verification, and the more so, as the only experiment we possessed was the negative one of Melloni, to which reference has been already made.

The energetic action of the solid and liquid compounds into which the element hydrogen enters, suggested the thought that hydrogen gas might act more powerfully than air, and the following means were devised to test this idea. A tube was constructed, having its ends stopped air-tight by polished plates of rock-salt held between suitable washers, which salt is known to be transparent to heat of all kinds; the tube could be attached to an air-pump and exhausted, and any required gas or vapour could be admitted into it. A thermo-electric pile being placed at one end of the tube, and a source of heat at the other, the needle of an extremely sensitive galvanometer connected with the pile was deflected. After it had come to rest, the air was pumped from the tube, and the needle was carefully observed to see whether the removal of the air had any influence on the transmission of the heat. No such influence showed itself—the needle remained perfectly steady. A similar result was obtained when hydrogen gas was used instead of air.

Thus foiled, the speaker put his questions to Nature in the following way : a source of heat, having a temperature of about 300° C., was placed at one end of the tube, and a thermo-electric pile at the other—a large deflection was the consequence. Round the astatic needle, however, a second wire was coiled, thus forming a so-called differential galvanometer ; a second pile was connected with this second wire, so that the current from it circulated round the needle in a direction opposed to that of the current from the first pile. The second pile was caused to approach the source of heat until both currents exactly neutralised each other, and the needle stood at zero. Here then we had two powerful forces in equilibrium, and the question now was whether the removal of the air from the tube would disturb this balance. A few strokes of the air-pump decided the question, and on the entire removal of the air the current from the pile at the end of the tube predominated over its antagonist from 40° to 50°. On readmitting the air the needle again fell to zero; thus proving beyond a doubt that the air within the tube intercepted a portion of the radiant heat.

The same method was applied with other gases, and with most remarkable results. Gases differ probably as much among themselves with regard to their action upon radiant heat as liquids and solids do. Some gases bear the same relation to others that alum does to rock-salt. The speaker compared the action of perfectly transparent coal-gas with perfectly transparent atmospheric air. To render the effect visible to the audience, a large plano-convex lens was fixed between two upright stands at a certain height above a delicate galvanometer. The dial of the instrument was illuminated by a sheaf of rays from an electric lamp, the sheaf being sent through a solution of alum to sift it of its heat, and thus avoid the formation of air-currents within the glass shade of the instrument. Above the lens was placed a looking-glass, so inclined that the magnified image of the dial was thrown upon a screen, where the movements of the needle could be distinctly observed by the whole audience. Air was first examined, the currents from the two piles being equilibrated in the manner described, the tube was exhausted, and a small but perfectly sensible deflection was the result. It was next arranged that the current from the pile at the end

of the tube predominated greatly over its antagonist. Dry coal-gas was now admitted into the tube, and its action upon the radiant heat was so energetic, the quantity of heat which it cut off was so great, that the needle of the galvanometer was seen to move from about 80° on one side of zero to 80° on the other. On exhausting the tube the radiant heat passed copiously through it, and the needle returned to its first position.

Similar differences have also been established in the case of vapours. As representatives of this diverse action, the vapour of ether and of bisulphide of carbon may be taken. For equal volumes, the quantity of heat intercepted by the former is enormously greater than that intercepted by the latter.

To test the influence of *quality*, the following experiment was devised. A powerful lime light was placed at one end of the tube, and the rays from it, concentrated by a convex lens, were sent through the tube, having previously been caused to pass through a thin layer of pure water. The heat of the luminous beam excited a thermo-electric current in the pile at the end of the exhausted tube ; and this current, being neutralised by the current from the second pile, coal-gas was admitted. This powerful gas, however, had no sensible effect upon the heat selected from the lime light; while the same quantity of heat, from an obscure source,* was strongly affected.

The bearing of this experiment upon the action of planetary atmospheres is obvious. The solar heat possesses, in a far higher degree than that of the lime light, the power of crossing an atmosphere; but, and when the heat is absorbed by the planet, it is so changed in quality that the rays emanating from the planet cannot get with the same freedom back into space. Thus the atmosphere admits of the entrance of the solar heat, but checks its exit ; and the result is a tendency to accumulate heat at the surface of the planet.

In the admirable paper of M. Pouillet already referred to, this action is regarded as the cause of the lower atmospheric strata being warmer than the higher ones ; and Mr. Hopkins has shown the possible influence of such atmospheres upon the life of a planet situated at a great distance from the sun. We have hitherto confined our attention to solar heat ; but were the sun abolished, and did stellar heat alone remain, it is possible that an atmosphere which permits advance, and cuts off retreat, might eventually cause such an accumulation of small savings as to render a planet withdrawn entirely from the influence of the sun a warm dwelling-place. But whatever be the fate of the speculation, the experimental fact abides—that gases absorb radiant heat of different qualities in different degrees ; and the action of the atmosphere is merely a particular case of the inquiry in which the speaker was at present engaged.†

HOW TO GROW LILLIPUTIAN PLANTS.

Chinese gardeners are famed for the skill with which they reduce plants which are naturally of some considerable size, and even large forest trees to the very smallest dimensions. Dwarf plants are in great demand all over the Celestial Empire, and are generally very expensive. The custom of keeping in sitting-rooms little stages ornamented with different things, and even with living plants, induced the gardeners of Europe to imitate the Chinese gardeners, although at a great distance, and to raise plants in tiny pots, generally choosing succulents, of which it is easy enough to obtain very small specimens. As experiments in this mode of cultivation increased, different kinds of plants were taken, and in Germany they at last succeeded in reducing hard-wooded plants and even forest trees themselves to a dwarf state. Thus, this art of the Chinese gardeners is transferred to Europe, and

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* The *quantity* of heat is measured by the amount of the galvanometric deflection which it produces ; its power of passing through media may be taken as a test of *quality*.

† While correcting the proof of this abstract, I learned that Dr. Franz had arrived at the conclusion that an absorption of 3.54 per cent. of the heat passing through a column of air 90 centimetres long takes place; for coloured gases he finds the absorption greater; but all colourless gases he assumes show no marked divergence from the atmosphere.—*Poggendorff's Annalen*, xciv., p. 337.

though the result is of no great importance, yet in a general horticultural point of view it is very curious.

The first gardener in Germany who cultivated Lilliputian plants—that is to say, plants with all their parts reduced to the smallest dimensions—was M. Boekel, from whose account we borrow the description of the method by which he attained this curious result. As examples of what he produced, he mentions a plant of ivy, with 22 leaves, which, together with its pot, might be covered by a large leaf of common ivy; also an oak (*Quercus robur*) 13 inches high, whose head formed a ball 6 inches in diameter. The details of his mode of operation are as follows:—

He had pots made of a very porous clay, the proper material for which was obtained by mixing equal portions of the clay used in making red and white pots, and adding 4 per cent. of ashes and 1 per cent. of sulphur. For woody plants, such as oaks or others, the pots are very shallow, from about 2 to 2½ inches high, and 6 to 6½ wide; for other plants he uses pots from 1 to 2 inches high and broad. These pots he filled with soil or earthy mixtures such as are usual in common cultivation; only he adds a third part of very small flinty gravel. The pots are filled up to the brim, and watered from below, by placing them in a dish containing water, or in a tin vessel made expressly for that purpose, with a tap, by means of which the water that is not absorbed is drawn off.

In order to make dwarfs of such plants as oaks, elms, &c., it is best to take one-year seedlings. In the spring their ends should be pinched off, to make them form laterals; then, when these have grown about two inches long, they are to be served in the same way, and the ends of all those which come afterwards are continually pinched off; the plants are then put into a cool place, to prevent their shoots becoming too much drawn up; otherwise, in general, they like a sunny situation best. From herbaceous plants, cuttings are taken and treated in the same manner. Climbing plants cannot be thus cultivated. To all plants which can bear this sort of treatment liquid manure should be given every three or four weeks; but care must be taken in administering this powerful stimulant, otherwise you may kill your plants. —*Journal de la Société Impériale et Centrale d'Horticulture*, and *Gardeners' Chronicle*, September 24th, 1859.

NATIVE COUNTRY OF THE POTATO.

In speaking of the potato, Dr. Weddell has recently made the following interesting remarks:—

"I never found the potato in Peru so circumstanced as to satisfy me that it is really wild in that country. Neither do I believe that it is wild in the distant stations on the extra-Chilian Alps where it has hitherto been thought so. When we consider that on the arid Cordilleras the Indians often fix their patches of cultivation on points that would appear almost inaccessible to our European farmers, it is easy to imagine how a traveller visiting one of these stations which had been long abandoned, and finding the potato accidentally surviving, would conclude that it must be really wild there. But where is the proof? For my own part, after reading all that has been written on the subject, I am forced to conclude that its real native country is Chili rather than Peru. There can be no doubt that the cultivation of the potato is of great antiquity, seeing that at the time of the conquest it was found in every part of the temperate portions of Western America from Chili to New Grenada and even Mexico, and I am very much inclined to think that it was everywhere the same species; for although the potato grown on the high plains of Peru possesses some degree of acridity, and resists frost better than those with which we are familiar, it does not appear from its botanical characters that it can be distinguished as a species rather than a simple race.——D'Orbigny brought from the summit of the Cerro de Potosi, and consequently from an elevation of 14,640 feet, a form of the potato which might be called Alpine. The leaves grow in rosettes and the flowers sit perfectly close upon the root. I found the same form in a piece of ancient cultivated ground on the Peruvian plateau at the height of 12,000 feet."

MISCELLANEA.

Poisoning by Acetate of Morphine.—The *Gazette des Hôpitaux*, of the 13th of September, mentions a case taken from the *Union Médicale de la Gironde*, in which a young pharmacien of Bordeaux took, in a wafer, fifteen grains of acetate of morphine, soon after dinner, with suicidal intentions. He walked home, a quarter of an hour afterwards, perfectly calm; but in a short time fell, as if thunderstruck, amidst the people with whom he lodged. Some time elapsed before Dr. Salviat arrived, two hours having expired since the morphine had been taken. The young man was lying on a mattress placed on the ground, quite insensible, the teeth clenched, the limbs relaxed, the eyes staring and unaffected by light, the face flushed, pulse full and somewhat quick. Dr. Salviat, not knowing the cause of this state of things, diagnosed cerebral congestion, and bled the patient from the arm. Whilst the blood was flowing, the patient opened his eyes, and seemed to recover his senses. He was then asked about the cause of the symptoms, and answered that he had taken fifteen grains of acetate of morphine. An attempt was now made to administer a large dose of tartar emetic, but this was found impracticable, as he relapsed into complete insensibility, with the teeth firmly clenched. The heated steel knob was now used over the epigastrium and abdomen, but to no avail, and the medical attendant went away despairing of his patient, leaving, however, directions that the solution of four grains of tartar emetic should be given if the patient recovered sufficiently. (We wonder that flagellation, or forced movements, were not resorted to before the doctor left.) Towards four o'clock in the morning the young man awoke, and took the emetic, which acted well, and afterwards some strong coffee, which had been prepared by Dr. Salviat's desire. At seven in the morning the latter returned to his patient, and found him better, though the coma was still complete. Questions were, however, pretty well answered, and the poor fellow stated that he had tasted the morphine in the matters ejected from the stomach. The egesta were, however, unfortunately not kept. A second emetic was given, as the vomiting had not been very copious the first time, and a strong solution of tannin was administered after the vomiting had ceased. The patient recovered perfectly, thirty-six hours after the ingestion of the morphine, and presented, after the coma was over, all the symptoms mentioned in medico-legal works as resulting from poisoning with morphine, except contraction of the pupils. No doubt remained as to the dose and the quality of the morphine, as the young man had prepared it himself in a wholesale house, where he had been employed at Paris. Dr. Salviat thinks that this recovery, after so enormous a dose of morphine, is to be attributed to the salt having been taken soon after a meal, and wrapped in a wafer. Some of it had probably been absorbed, and the rest mixed with the food. As digestion was suspended by the coma, it is likely that the greater part was not absorbed, and that it was afterwards rejected with the vomited matters, the patient having tasted the morphine when throwing it up.—*Lancet.*

Adulteration of Tobacco.—The following case has been disposed of before Lord Ardmillan and a jury, at Edinburgh:—Mr. William Black, dealer in tobacco, snuff, and other articles, Clyde Street, Glasgow, was charged, at the instance of the Inland Revenue Department, with a breach of the Excise regulations. The information against him contained twelve counts, and the trial occupied the court the entire day. About half-past six o'clock the jury returned a unanimous verdict for the Crown on the fourth and eight counts, and for the defender on the others, the two counts found proven being to the effect that the defender had in his possession about 70lbs. of rhubarb and sycamore and other leaves, to be added to or mixed with tobacco, and that he had delivered the same to a Mr. John Yeates, Greenock. The penalties are £200 for each count.

Tungsten Steel.—Tungsten has nearly the same specific gravity as gold; and for hardness nearly approaches the hardest of natural bodies. It is found usually in company with tin stone and has been hitherto regarded as a mineralogical curiosity. One of the richest sources of the ore of Tungsten is in the tin-mines of Zinnwald, Bohemia, where it has been thrown into heaps as worthless for nearly 500 years. Franz Mayr, the proprietor of cast-steel works at Kapfenberg, in Styria, has combined this hitherto unprofitable metal with iron, and made from it steel of remarkable goodness, cheaper than English steel, and, it is said, in some respects superior. Excellent cutlery and tools have been made from it.—*Dingler's Polytechnisches Journal.*

A Pharmacopolic Combination.—The pharmaciens of Ghent have come to an understanding amongst themselves that no prescription, prepared for the second time, and by a pharmacien who had not prepared it at first, should be charged less for than was originally demanded. On the prescription shall be placed the stamp of the first pharmacien, with such signs to be agreed upon, which shall acquaint all the subsequent operators with the price charged for the first preparation. This is a healthful tendency at fair dealing with each other, and a death-blow to that professional bane—underselling one another.—*Lancet.*

THE CASE OF SMETHURST.

The following is a copy of a letter addressed by the Right Hon. Sir G. C. Lewis to the Lord Chief Baron, communicating the grant of a free pardon to Smethurst, so far as the alleged murder of Isabella Banks is concerned:—

"Whitehall, Nov. 15, 1859.

"My Lord,—I have the honour to acknowledge the receipt of your Lordship's further report, of the 18th ult., on the case of Thomas Smethurst, who was convicted at the Central Criminal Court in August last of murder, and sentenced to death.

"As your Lordship suggests in that report that reference should be made to the judgment of medical and scientific persons selected by the Secretary of State, for the purpose of considering the symptoms and appearances of the deceased Isabella Banks, and the result of the analysis, I have sent the evidence, your Lordship's reports, and all the papers bearing upon the medical points of the case, to Sir Benjamin Brodie, from whom I have received a letter, of which I enclose you a copy, and who is of opinion that, although the facts are full of suspicion against Smethurst, there is not absolute and complete evidence of his guilt.

"After a very careful and anxious consideration of all the facts of this very peculiar case, I have come to the conclusion that there is sufficient doubt of the prisoner's guilt to render it my duty to advise the grant to him of a free pardon, which will be restricted to the particular offence of which he stands convicted; it being my intention to institute a prosecution against him for bigamy.

"The necessity which I have felt for advising Her Majesty to grant a free pardon in this case has not, as it appears to me, arisen from any defect in the constitution or proceedings of our criminal tribunals. It has arisen from the imperfection of medical science, and from the fallibility of judgment, in an obscure malady, even of skilful and experienced medical practitioners. "I have, &c.,

"The Lord Chief Baron, &c." "G. C. LEWIS.

THE ALLEGED CASE OF POISONING AT POPLAR.

Central Criminal Court, Oct. 27th.

(Before the Lord Chief Baron and Mr. Justice Williams.)

George Frederick Royal was indicted for the wilful murder of Zipporah Wright.

The Solicitor-General, Mr. Welsby, Mr. Clerk, and Mr. Metcalfe conducted the prosecution; Mr. Sleigh and Mr. George Tayler defended the prisoner.

An abstract of the evidence adduced at the inquest on the body appeared in the August number of this Journal.

The *Solicitor-General*, in opening the case, alluded to the crime of murder by poison, which, he said, was always very difficult of detection, and was generally most difficult in proof, and he desired their most serious attention to the evidence. He then said that it would appear that the prisoner was a married man, but he had left his wife a considerable time, and cohabited with the deceased, who passed as his wife. The suggestion on the part of the prosecution was that, either from a desire to rid himself of an encumbrance or some other motive, the prisoner had destroyed the life of the deceased by poisoning her. The following evidence was then adduced:—

Margaret Allen, with whom the deceased and the prisoner lodged, stated that they lived together on "middling terms," and that on the 28th of April deceased had a very good confinement. On the 31st of May witness heard a moaning, and went to the room of deceased, and found her suffering great pain and sickness, and a burning sensation in the throat. Brandy was administered, but the symptoms increased, and Dr. Webb was sent for. She continued to get worse and died on Saturday, June 4th. In reply to a question from witness, the deceased said she had taken some coffee made for her by the prisoner, which was very bitter. She

afterwards said several times, "God forgive that man," meaning, as witness supposed, the prisoner.

Eleanor Stubbs, deposed to having attended the deceased in her confinement, and corroborated the evidence of the former witness.

Jane Wright, mother of deceased, gave similar evidence, and stated that she charged the prisoner, when in the room of the deceased, with having poisoned her daughter.

Dr. Webb, medical officer of the western district of Poplar Union, stated that he went to the deceased on the 31st of May, and found her suffering from a burning sensation in the throat, attended with vomiting and purging. His partner had seen the patient in the morning, and prescribed opium and calomel, which treatment he continued. There was a little improvement for a short time, but the symptoms returned in an aggravated form, and deceased continued to get worse until she died. Witness made a *post-mortem* examination of the body, and found some very acrid matter in the stomach. Portions of the body, &c., were sent to Dr. Letheby for analysis.

Dr. Letheby stated that on the 8th of June four bottles were brought to him for analysis, containing portions of the viscera and part of the contents of the stomach. He was unable to find any mineral poison, but from a quantity of treacle-looking liquid, he obtained about a drop of an oily liquid, which was very acrid, and on application to his lip produced blisters; some of the same description of oily matter was found in the vomit and in the contents of the stomach. At one time he thought it might be cantharides, but he was satisfied that it was not. A small portion of the matter was administered to a guinea-pig, and it was dead in ten minutes; it was again extracted from the body of the guinea-pig and administered to some sparrows, one of which died in four minutes, and another in a quarter of an hour. Witness was of opinion that death in this case did not arise from any natural disease, but from the administration of some foreign irritant, and he had never heard or read of a matter of the description he had mentioned being generated spontaneously in the stomach.

Dr. Thomas Alfred Baker and *Dr. Garrod* gave evidence to the effect, that in their opinion the deceased did not die from any natural disease, and that the symptoms were caused by the administration of some irritant.

Dr. Baker, in reply to Mr. Sleigh, said he was aware that the secretions of the body in certain cases underwent great changes, but he did not believe they would become so acrid as to cause the death of an animal. He had heard of cases where animals had been poisoned by the administration of vitiated bile, but it was generally considered by the medical profession that the cases so reported could not be depended on.

It was stated by one of the former witnesses, Eleanor Stubbs, that the deceased was in the habit of putting common washing soda into her tea, but the medical witnesses, on being recalled, said that this circumstance made no difference whatever in the opinion they had formed of the case.

After the examination of several other witnesses, Mr. Sleigh addressed the jury for the prisoner, the speech occupying two hours and three-quarters.

There were no witnesses called for the defence, but it was argued that, as the real nature of the acrid matter discovered in the stomach could not be determined by chemical experiment, it might have been generated by disease.

The Lord Chief Baron then summed up, and the jury, after a short deliberation, returned a verdict of *Not Guilty*.

POISONING BY ACETATE OF LEAD.

New Court.

(Before Mr. Baron Bramwell.)

Edmund Keefe, 20, labourer, and James Turner, 22, labourer, were indicted for feloniously administering to Honora Turner a large quantity of a poison called sugar of lead, with intent to murder her.

Mr. Doyle prosecuted.

It appeared from the statement of the learned counsel, which was fully borne out by the evidence, that the prisoner Turner and the prosecutrix were married in February last, and not very long afterwards separated, and had since then been living apart. Upon the 29th of August, the prisoners both went to see the prosecutrix where she was living, and they had some beer, into which the sugar of lead was put by Turner while the prosecutrix had turned her back. They then left, and prosecu-

trix and another woman partook of some of the beer from the glass, and had no sooner done so than they were attacked with most violent sickness, and for some time were ill. Near to where Turner had sat, upon the floor, was found some sugar of lead. From a statement made by Keefe, he, it seems, had bought the drug for Turner, who alone put it into the beer. He (Turner) had expressed some sentiments of a revengeful character, which showed the animosity he bore towards his wife for having made some statement to his employers, Messrs. Maudslay, which led to his discharge.

The jury *Acquitted* Keefe and returned a verdict of *Guilty* against Turner.

The learned Baron directed sentence of death to be recorded against him.—*Times*, Oct. 29th.

OBITUARY.

DEATH OF PROFESSOR GEORGE WILSON OF EDINBURGH.

At the moment of going to press we received intelligence of the death of Dr. George Wilson, Professor of Technology in the University of Edinburgh, Regius Keeper of the Industrial Museum of Scotland, and Honorary Member of the Pharmaceutical Society. This sad event, by which an accomplished Chemist has been cut off in the prime of life, occurred on Tuesday evening, the 22nd of November. Dr. Wilson had long been in a delicate state of health, and he was carried off by a renewed attack of inflammation of the lungs from which he had previously suffered.

BOOKS RECEIVED.

An Introduction to Practical Pharmacy, *designed as a Text-Book for the Student, and as a Guide for the Physician and Pharmaceutist; with many Formulæ and Prescriptions.* By Edward Parrish. Second Edition, greatly enlarged and improved, with 246 Illustrations. Philadelphia: Blanchard and Lea. 1859. 8vo, pp. 720. (From the Publishers.)

A System of Instruction in Qualitative Chemical Analysis. By Dr. C. Remigius Fresenius. Fifth Edition. Edited by J. Lloyd Bullock, F.C.S. London: John Churchill, New Burlington Street. 1859. (From the Publisher.)

Notes on the Dispatch of Troops by Sea. By Charles J. Kirwan, Esq., L.R.C.S.I., &c. Thacker and Co., Calcutta, Bombay, and London.

The Animal Kingdom, arranged according to its Organization; *serving as a foundation for the Natural History of Animals, and an introduction to Comparative Anatomy.* By Baron Cuvier. With Figures designed from Nature. Part I. By M. Latreille. Illustrated with Coloured Steel Plates. London: Grieves, Henderson, & Co., Red Lion Court, Fleet Street.

The Influence of the Microscope upon the Progressive Advance of Medicine: *An Address delivered at the Opening of the Session* 1859-60 *at the Liverpool Royal Infirmary School of Medicine.* By Cuthbert Collingwood, M.A., M.B., Oxon., F.L.S., Member of the Royal College of Physicians of London, &c., &c., &c.

TO CORRESPONDENTS.

Facts and Fallacies.—We have received a communication with this title, in which the author complains of the tone adopted in a sentence contained in the last number of this Journal. Regretting as we do that any of the remarks made by our contributors should have the effect of wounding the feelings of others, and being always anxious to avoid this result, we appeal to *A. S.* whether the publication of his letter would not tend to aggravate the evil, as he certainly has not himself avoided the fault complained of.

Syrup of Ginger.—Mr. Whipple suggests that the syrup made by the process recommended by Mr. B. S. Proctor, at page 261 of the last number of this journal, should be called "*Fluid Ginger Soap with Sugar and Sulphate of Potassa.*"

Chloric Ether.—Mr. Whipple has sent a communication on this subject, explaining what he stated at the Meeting, reported at page 306. Mr. Whipple is mistaken in supposing that the liquid to which he has referred, and which was described by Dr. Thomson under the name of chloric ether, has any better claim to that title than chloroform has, in accordance with the views of modern chemists. The liquid which Dr. Thomson described under the name of "chloric ether" is now called *Dutch liquid* or *bichloride of olefiant gas.* A liquid resembling this in some of its characters and roperties, and at first supposed to be identical with it, having been subsequently

obtained by distilling a mixture of chloride of lime and alcohol, the name *chloric ether* was applied to such product; and under that name it has been, and still is, extensively used in medicine, although Dumas, in 1834, showed that the medicinal chloric ether was in fact a solution of chloroform in spirit.

Paraffin Oils.—The liquids sold under this name for burning in lamps are obtained as products of the distillation of certain varieties of coal, or peat, or mineral bitumen. Some account of the mode of producing these oils, together with other products, is given at page 162, vol. xiii., of this Journal. There have been several patents taken out for the manufacture, and the oils met with in commerce differ in some of their characters according to the process adopted, or the source from which the oil is derived.

Use of Arsenic in the Manufacture of Glass.—Mr. Joseph Green, of York, calls our attention to the employment of arsenious acid at glass works, and suggests that the glass in the manufacture of which arsenic has been used, if made into bottles, may be capable of contaminating alkaline liquids when put into such bottles. We believe the whole of the arsenic, when put into glass, is driven off by the heat to which the fluid-glass is subjected. It is used as an oxidizing agent, the arsenic being reduced in contact with substances present in the glass with which the arsenious acid comes in contact. Of course, if any portion of the arsenic remained in the glass its use would be highly objectionable. Has our correspondent ever found it present?

The "Confections" of the Pharmacopœia.—*Chemicus, M.P.S.*, calls our attention to the unsatisfactory state of these preparations, and hopes the formulæ for them will be improved in the new Pharmacopœia. The subject has already received the attention of the Pharmacopœia Committee.

Effects of Chloroform on Bees.—Mr. W. Laird, of Dundee, states, in reference to a notice on this subject, which appeared in our October number, that the experiment was made by himself, and not by Mr. Annan, as there stated. The plan adopted was as follows:—A tube of paper was prepared, about one inch in diameter, and twelve to fifteen inches long, into which a small piece of cotton wool or other spongy material was inserted about an inch from its extremity. On this cotton wool a drachm of chloroform was poured; the tube was then applied to the entrance of the hive, and the chloroform vapour blown in until the bees were quiet.

An Australian Chemist (London).—(1.) *Transparent Soaps* are made by dissolving soap in spirit; the resulting product is then coloured and scented, and cast into moulds. (2.) Piesse's *Art of Perfumery*, published by Longman.

Cavendish.—Plaster of Paris would probably answer the purpose best.

Scruple (Honiton).—*Tincture of Myrrh and Borax.* Vol. viii., page 96.

S. (London).—*Show Colours.* Vol. iii., pp. 94, 143, 192, 341; vol. x., p. 92. The vegetable reds mentioned in the forms referred to are not permanent. A solution of iodine would be more permanent, but the colour is not so good.

J. M. C. (London).—Benzole is, we believe, sometimes used in making varnish for photographic purposes.

M., Manchester, (1) wishes to know the composition of the substance called "Railway Grease." (2.) The label referred to is not liable to medicine stamp duty.

"*Palpebris*," and *J. J.* (Norwich), should apply by letter to the Secretary, 17, Bloomsbury Square, giving name and address.

G. D. Southampton) wishes to know the address of the proprietor of "M. Nesberg's Corn and Bunion Exterminator."

Mr. J. Dinnant (Sandown, I.W.) is thanked for his communication.

Studens (London).—(1.) We are unable to give the information. (2.) Vol. xii., pp. 70, 134, 137. (3.) *Annotto.* Vol. xv., p. 198. (4.) The works alluded to are out of print.

Senna (Liverpool).—We know of no use to which senna pods are applied in this country. Their properties are similar to the leaflets, but they are much milder in their operation.

C. S. (London).—The seeds of the yew are unwholesome, but the fruit from which they have been extracted is quite free from danger.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. VI.—JANUARY 2nd, 1860.

THE JACOB BELL MEMORIAL.

It is with great satisfaction we refer to the progress of the Jacob Bell Memorial Fund. The amount which has already been subscribed leaves no doubt of the complete success of the undertaking, and of the realization of all that was anticipated by its most sanguine promoters. Including subscriptions which have not been reported from the country, the aggregate amount cannot now be less than £1800, and considering the generally spontaneous manner in which this large sum has been contributed, there is every reason to expect that it will yet be considerably augmented. There are many towns from which no returns have been received,—others from which there are only partial returns, and these contain some of the staunchest supporters of the Society and its educational objects, whose names will no doubt appear in the list when completed.

The most important features in the list published this month, are the communication from the Royal College of Physicians, and the subscriptions from the President, Censors, Registrar, and several Fellows of that body, together with the subscription from the President of the Royal College of Surgeons. Nothing could possibly have afforded more convincing evidence than this of the importance of the position occupied, and the objects contemplated and partly realized, by the Pharmaceutical Society. This act of the College of Physicians confers upon us a deep debt of gratitude, and ought to stimulate us to renewed exertions in "promoting the advancement of Pharmaceutical science," by the further extension and more vigorous application of the means provided by the Society for carrying out its educational objects. It is indeed encouraging to find that the persevering efforts of those who originated and have brought to maturity the institution for the advancement of Pharmaceutical science with which Jacob Bell's name is so honourably associated, have been rewarded with the gratifying recognition and

mark of confidence implied in the resolution passed by the highest medical corporation in this country, still further indicated by the subscriptions which have been so liberally appended by the distinguished officers and fellows of the College. Well might the late Professor Wilson say, in his address delivered in Edinburgh at a meeting of the Pharmaceutical Society, "You cannot go back. You have committed yourselves to the nation to go forward. Even if you wished to halt, the medical profession would compel you to advance, or to leave the field altogether. A great change in the laws regulating the medical schools and corporations is raising, day by day, the standard of medical education, and the leaders of those bodies beckon you to follow them in their upward ascent. * * A great future is before you. See that everything is done to hasten its fulfilment." May these, the last publicly expressed sentences of a great and good man, be received and cherished as a prophetic exhortation!

SALE OF DANDELION COFFEE.

For several years past a preparation called Dandelion Coffee has been growing into more and more general demand, and it is now sold by Chemists throughout the country. It consists either wholly or principally of dandelion root, which has been dried, powdered, and otherwise prepared, so as to give it something of the character of ground coffee or cocoa. Two modes of preparation, especially, have been adopted. One consists in cleaning, drying, and powdering the dandelion roots, and mixing the powder with a portion of ground coffee; and the other consists in simply torrefying or roasting the dried and powdered roots, and using them in that state without any admixture. In the process of roasting, the saccharine matter contained in the root is converted into caramel, one of the flavouring constituents of roasted coffee, and the powder acquires a brown colour somewhat resembling that of coffee. When well prepared it might be called a coffee-substitute, and it resembles coffee in its physical characters quite as nearly as some of the many substitutes for coffee which at different times have been used or suggested. It must be admitted, however, that it would be a very bad substitute for coffee, and not at all likely to take its place as a dietetic, for it contains none of the peculiar principle which is found in tea, coffee, cocoa, and other members of that class of dietetics. It has not been introduced with the view of replacing coffee, but rather with the view of promoting the use of a mild and, in the opinion of some persons, an efficacious medicine, by depriving it, as far as possible, of its medicinal characters, and assimilating it to an article of diet. Many persons will take dandelion coffee who would object to continue the use of one of the more distinctly medicinal preparations of taraxacum. It may be questioned, however, whether the roots, after being torrefied, retain the same medicinal efficacy as they possess when only carefully dried and powdered. Some of the manufacturers of dandelion coffee consider that a more efficacious as well as more palatable preparation is produced by using the unroasted root, and mixing it with a portion of coffee, the flavour of which tends to cover that of the taraxacum. The name dandelion coffee is considered to be justified by the admixture of coffee with the dandelion, while it is not correctly applied to the

dandelion alone. For these reasons the latter mode of preparation has been extensively adopted, and we believe many Chemists have been selling this mixture without ever suspecting that they were infringing the law. Some years ago the question was asked by some of the Members of our Society whether they could sell a mixture of dandelion and coffee for medicinal use, without interfering with the regulations of the Excise, and an application was made by the late Mr. Bell to the Chairman of the Board of Inland Revenue on the subject. This occurred in 1852, and the correspondence which took place was published in the twelfth volume of this Journal, at page 305. It was as follows :—

"15, *Langham Place, Nov.* 22, 1852.

"My dear Sir,—The recent alteration in the Treasury minute, respecting the mixture of ground coffee with other ingredients, has led to some doubts as to the legality of the sale of a medicinal preparation called 'Dandelion Coffee.'

"This consists of the root of dandelion, or taraxacum, prepared and ground with a portion of coffee. It is recommended to patients as a convenient mode of taking dandelion, the flavour of which is so disguised by the coffee, that it is used as a beverage.

"I should feel obliged if you would inform me whether this preparation is included among the prohibited mixtures of coffee; and if so, how Chemists should act when medical men prescribe dandelion coffee for their patients.

"I am, my dear Sir, yours truly,

"To John Wood, Esq., "Jacob Bell.
"*Chairman of the Board of Inland Revenue.*"

"*Inland Revenue, Nov.* 26, 1852.

"My dear Sir,—In such a case as you put, of Dandelion Coffee used as medicine, our Board would not interfere. "Most truly yours,

"To Jacob Bell, Esq." "John Wood.

This was by no means a satisfactory settlement of the question. In the first place, the statement that the Board *would* not interfere in a case such as that put, implies that they *could* interfere if they felt disposed to do so. And then, it is not very clear what the case, referred to by Mr. Wood as having been put by Mr. Bell, really was. Was it the case of a Chemist selling Dandelion Coffee, to be used as a beverage, without any medical order for it? Or was it the case of a medical man prescribing it for a patient? The answer of the Board was obviously worded in a most guarded manner, but it was construed at the time as a permission to sell a mixture of dandelion and coffee, if used as a medicine. Many Chemists have acted upon this understanding, and we have not heard of any case in which the Excise have instituted proceedings against a Chemist for selling Dandelion Coffee containing a portion of coffee. Within the last few weeks, however, the question has been again raised; Mr. Brady, of Newcastle, having, on behalf of himself and others, applied to the Council of the Pharmaceutical Society for information with regard to the state of the law on this subject. The Secretary having stated the case to the Board of Inland Revenue, received the following reply :—

"*Inland Revenue, London,* 30*th November,* 1859.

"Sir,—The Board beg to inform you, in reply to your inquiry of this day's date, that the sale of 'Dandelion Coffee' will not be interfered with by this department, provided the article be found free from any admixture of coffee.

"I am, Sir, your obedient Servant,

"Wm. Corbett,

"To Elias Bremridge, Esq." "*Assistant Under-Secretary.*

In order to render this and the previous communication from the Board more intelligible, we must refer to the law relating to the sale of coffee, and to the objects with which the Excise regulations are enforced.

The law requires that those who deal in coffee should have a licence, the cost of which was originally 10*s.* a year, but a war tax having been added to it, the cost of the licence is now 11*s.* 6½*d.* a year. This licence applies to the sale of tea, coffee, and pepper. It renders the dealer subject to the visits of the Excise officer, who has power from time to time to examine the stock, but practically, we believe, such visits are only paid when there is suspicion of unfair dealing. It is the duty of the exciseman, as far as he is able, to prevent the revenue and also the public from being defrauded or injured in the sale of those articles subject to his supervision. In accordance with this object the law requires that no other substance but chicory shall be mixed with ground coffee, unless express permission be obtained from the Board of Inland Revenue. We believe there are two or three instances, and no more, in which such permission has been given, and when application is made, sufficient grounds must be shown to justify the Board in giving their assent. The law further requires that in the sale of coffee which has been mixed with any other substance, it shall be distinctly stated on the label, "This is sold as a mixture of coffee and ———." In order, therefore, to legalize the sale of a mixture of coffee and dandelion, three conditions must be fulfilled:—1st. The dealer must have a licence. 2nd. The admixture of dandelion root with coffee must be sanctioned by the Board of Inland Revenue. 3rd. It must be stated on the label, "This is sold as a mixture of coffee and dandelion."

The permission of the Board of Inland Revenue for selling a mixture of dandelion and coffee has not yet been obtained, and therefore the sale of such mixture is, strictly speaking, illegal; and, although referring to Mr. Wood's note of 1852, it appears that the Board were not at that time disposed to interfere with the sale of the mixture so long as it was used strictly as a medicine, it may be inferred, from the communication last received from the Board, that Chemists cannot now safely continue the sale without fulfilling the conditions required by the law. It remains for them to consider whether it is most desirable to apply for permission to mix dandelion with coffee, and to take out a licence for its sale, or to avoid an infringement of the law, by omitting the coffee altogether, and either selling the simple torrefied dandelion root, or mixing it with something else besides coffee. It has been suggested that a mixture of dandelion and cocoa, under the name of "Dandelion Cocoa," would probably answer quite as well as "Dandelion Coffee," while for the sale of cocoa there is no licence required. If, however, it should be thought desirable to apply for permission to mix dandelion with coffee, the application would be made with more effect by the Council of the Pharmaceutical Society than by any members of the trade in their private capacity, but at present there is no proposition to that effect before the Council.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *7th December*, 1859,

Present—Messrs. Bird, Bottle, Brew, Bucklee, Cupiss, Deane, J. B. Edwards, Hanbury, Haselden, Herring, Meggeson, Morson, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

BISHOPWEARMOUTH .....Thompson, John Robert
LEWISHAM .....Baker, Alfred Philip
LINCOLN .....Hayward, Charles John
LIVERPOOL .....Banner, Samuel
NEWCASTLE-ON-TYNE .....Mann, Robert
SHEERNESS .....Rayner, William
TAUNTON .....Fouracre, Robert

MINOR EXAMINATION, *20th December.*

Brett, Robert.....Bath
Crowe, Thomas Lea .....Hereford
Earle, Francis .....Leeds
Gilbert, George Fagge .....London
Hickman, William .....Manchester
Jones, Charles William .....Carmarthen
Keene, John .....Brighton
Lawrence, Henry .....Stratford
Norrish, James .....Crediton
Orton, Thomas Johnson .....Nuneaton
Pertwee, Frederic .....London
Potts, Robert Alfred.....London
Renaud, Desiré Monchiry .....Clapham
Reynolds, Freshfield .....Guildford

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Blackbourn, Henry James	Mr. Jeffery	Horncastle
Bolton, Edgar Benjamin	Mr. Fairbank	Woolwich
Coles, John William	Mr. Coles	Camberwell
Hickman, William	Messrs. Argles	Maidstone
Hughes, Thomas Jones	Mr. Hughes	Holyhead
Lightfoot, John	Mr. Shepheard	Chester
Payne, Sidney	Mr. Kendall	Stratford-on-Avon
Pratt, Albert Edward	Mr. Smith	Bury St. Edmunds
Wearing, Richard H.	Mr. Wearing	Liverpool

THE JACOB BELL MEMORIAL.

"*To the President of the Council of the Pharmaceutical Society.*

"SIR,—I am authorized by a resolution of the Royal College of Physicians, in *Comitia majora*, to express to the Council of the Pharmaceutical Society 'the high sense which the College entertains of the character of the late Jacob Bell, and their cordial approval of the proposed scheme to promote the advancement of Pharmaceutical Science, by establishing Scholarships, to be named after the distinguished founder of the Pharmaceutical Society.'

"I can execute this resolution of the College in no better way than by using the very terms in which it is couched, with the most cordial assurance that it meets with my hearty concurrence.

"I remain, Sir, yours very faithfully,

"THOS. MAYO,

"*Dec. 1st*, 1859." "*President of the Royal College of Physicians.*

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued*).

Amount previously advertised, £1501 2*s.* 0*d.*]

Royal College of Physicians, Dec., 1859.

The College having resolved that the President be requested to address to the Council of the Pharmaceutical Society a letter expressive of the high sense which the College entertains of the character of the late Jacob Bell, and of their cordial approval of the proposed scheme to promote the advancement of Pharmaceutical Science, by establishing Scholarships to be named after the distinguished founder of the Pharmaceutical Society,—We, the undersigned, desire to promote the object in view by contributing the sums appended to our names.

	£	*s.*	*d.*
Thomas Mayo, President	2	2	0
T. A. Barker, Censors	1	1	0
William Baly, Censors	1	1	0
T. Weber, Censors	1	1	0
William N. Gall, Censors	1	1	0
H. Pitman, Registrar	1	1	0
John Spurgeon	1	1	0
Thomas Watson	2	2	0
C. J. B. Williams	2	2	0
A. B. Garrod	2	2	0
James Arthur Wilson	1	1	0
George Cursham	1	1	0
Frederic J. Farre	2	2	0
George Johnson	1	1	0
Richard Quain	2	2	0
A. P. Stewart	1	1	0
R. Gueneau de Mussy	1	1	0
Henry Bence Jones	1	1	0
Seth Thompson	1	1	0

Arnott, James Moncrieff, F.R.S., &c., President of the Royal College of Surgeons	2	2	0
A Commercial Traveller, per Messrs. Booth	0	5	0
Allen, Thompson	0	10	0
Anthony, Jacob, Bedford	1	1	0
Aslin, John, and Co., Sunderland	1	1	0
Barnes, James, Preston	1	1	0
Barry and Sons, Northampton	1	1	0
Bland, John H., Stourbridge	1	1	0
Boast, Thomas, York	1	1	0
Booth and Son, Rochdale	2	2	0
Brandreth, John, Preston	0	10	6
Breton, Walter, Brighton	1	1	0
Brevitt, William Y., Wolverhampton	1	1	0
Cole, William Henry, 52, Gracechurch Street	5	5	0
Coleman, W., Wolverhampton	0	10	6
Cooper, George, Exeter	1	1	0
Cullen, William, 37, Beckford Row, Walworth	2	2	0
Dawson, Thomas, Preston	0	10	6
Dulley, J., Wolverhampton	1	1	0
Edsforth, J., Rochdale	0	2	6
Evans, Alfred, Exeter	1	1	0
Fairley, Thomas, and W. E., Sunderland	1	1	0

	£	s.	d.
Farmer, Robert A., 40, Westminster Road	5	5	0
Fleeming, William, Wolverhampton	1	1	0
Fletcher, John B., 17, New Burlington Street	1	1	0
Fouracre, Robert, Taunton	1	1	0
French, Joseph B., Castlemaine, Australia	1	1	0
Garside, Burdett F., Southpool	0	10	0
Gissing, Thomas W.	1	1	0
Gow, Alexander, Wolverhampton	0	10	0
Hadfield, J., Rochdale	0	5	0
Hart, Hugh, Glasgow	0	10	6
Hawke, William, 17, Wilde Court, Great Queen Street	2	2	0
Head, John, Lewes	1	1	0
Hughes, Samuel, Stourbridge	1	1	0
Husband, Matthew, Exeter	1	1	0
Ingamells, Charles, Boston	0	10	0
Jones, Charles William, Carmarthen	0	10	6
Knight, John A., Norwich	0	10	6
Leay, Joseph, Birmingham	1	1	0
Lewin, Edwin C., Boston	0	10	0
Marshall, Robert, Boston	1	1	0
Murdoch, George, Glasgow	1	1	0
Murdoch, James, Glasgow	1	1	0
Nicholls, James, Stourbridge	1	1	0
Oakey, Joseph M., Preston	0	10	6
Ough, William, Totness	0	10	6
Palk, John, Exeter	1	1	0
Parker, Frederick P., Derby	1	1	0
Partington, W., Rochdale	0	2	6
Pilley, Messrs., Boston	0	10	0
Pollock, G. D., M.R.C.S.L., Grosvenor Street	1	1	0
Potter, Henry, M.R.C.S.L., 22, George Street, Hanover Sq.	2	2	0
Raw, John, Preston	1	1	0
Ritson, John, and Sons, Sunderland	1	1	0
Rogerson, Michael, Bradford	2	2	0
Rook, Edward, Sittingbourn	0	10	6
Rothwell, J. H., Rochdale	0	5	0
Sawyer, Thomas, Ramsgate	1	1	0
Sharples, George, Preston	1	1	0
Shipman, G. V., Woolwich	0	5	0
Simonds, William, Boston	1	1	0
Smith and Govan, St. Andrew's	3	0	0
Southall, William, Birmingham	5	0	0
Southall, Thomas, Birmingham	5	0	0
Southall, William, jun., Birmingham	1	1	0
Stevenson, Richard, Derby	1	1	0
Taylor, John, Preston	0	10	6
Taylor, Edward, Rochdale	0	10	6
Thorby, Thomas, 21, Blomfield Road, Maida Hill	5	5	0
Trix, John, Exeter	1	1	0
Walker, William Henry, Southport	1	1	0
Warwick Brothers, 3, Garlick Hill	2	2	0
Westall, Richard H., Ramsgate	1	1	0
White, Thomas, Bilston	1	1	0
Williams, Philip, Horsham	1	1	0

ERRATUM, p. 300.—Gutch, J. W. G., M.R.C.S.L., *for* 55, Upper Charlotte Street, *read* 52, Upper Charlotte Street.

PHARMACEUTICAL MEETING.

Wednesday, December 7th, 1859.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

Journal of the Society of Arts. From the Society of Arts.
Photographic Journal. From the Photographic Society.
The Linnean Transactions. From the Linnean Society.
Journal of the Brussels Society of Pharmacy. From the Society.
The Dentist. From the Publisher.
Specimen of Podophylline. From Messrs. Bradley and Bourdas.
Specimen of *Cantharis vesicatoria*, caught in Norfolk in the present Autumn. From Mr. Deane.
Specimen of a Beetle which has been found constituting an adulteration to the extent of about 10 per cent. in a recent importation of Spanish Flies. From Mr. Thomas Herring.
Specimens of Syrup of Iodide of Iron. From Messrs. T. and H. Smith, of Edinburgh, and Mr. J. W. Williams, of Giltspur Street.

Professor Bentley, referring to the specimen of blistering fly received from Mr. Deane, said this was not the first occasion on which the true *Cantharis vesicatoria* had been found in the eastern counties of England, for it had been seen in other years in abundance in Essex, Suffolk, and Norfolk. The other specimen of a beetle found mixed with the true Spanish fly was very distinct from it.

Dr. Redwood thought the circumstances connected with the presentation of two of the specimens before the meeting would serve to illustrate the importance of the study of the natural history of drugs to the Pharmaceutist. The cantharides which had appeared in Norfolk, although found in some localities in considerable numbers, and examined by Druggists, had not been preserved for use because it was doubted whether they were the true blistering flies. These valuable insects were thus lost for want of the knowledge required to identify them. In another case the adulteration of cantharides by the admixture of 10 per cent. of an inert insect was detected by the application of such knowledge.

The following communications were read:—

NOTE ON SYRUP OF IODIDE OF IRON.

BY MESSRS. T. AND H. SMITH.

It is very creditable of Mr. Edward Smith to take the trouble to experiment and to publish (as he does in your last number) those experiments, showing that there are weak preparations of Syrupus Ferri Iodidi in the market; but if, in so doing, he draws erroneous inferences calculated to mislead, it may not be unbecoming in us to show the error of those inferences, not alone for the sake of truth, but also in justice to those manufacturers who send out a perfect Syrupus Ferri Iodidi which is colourless.

Mr. Edward Smith appears to infer that, because he has "not been able to

prepare perfectly colourless Syrupus Ferri Iodidi of Ph. L. strength," it cannot be done; and that because he procures a few samples having a want of strength in proportion to their want of colour, "deficiency of colour beyond a certain point would seem to *indicate* deficiency in strength!" Were such an *indicator* believed in, manufacturers inclined to be dishonest would simply have to expose their *weak* syrups to the action of the air to obtain a sufficient depth of colour to *indicate* strength! while the honest manufacturer, who is proud of sending out a perfect and a beautiful article, would at least be subject to suspicion.

Sufficient care and sagacity are all that is necessary to the production of colourless Syrupus Ferri Iodidi of officinal strength, in proof of which we send you, herewith, a sample of that which we are in the habit of making. We applied Mr. Edward Smith's test to it, and proved it to contain between thirty-nine and forty grains of iodide of iron in the fluid ounce. There is no necessity, however, for following all the steps of that test, and as the knowledge of a simpler test may encourage Pharmaceutic purchasers to examine for themselves, we will describe the test as we applied it.

Dilute a fluid ounce of the syrup in question with about four times its bulk of water, and add to it cautiously, and with constant stirring, a solution of bichloride of mercury of the strength of one grain in each fluid drachm; and, towards the close of the precipitation, add this solution drachm by drachm, filtering a little, and testing it between each addition until no further precipitate is given. Now read off the number of fluid drachms or grains used, which was thirty-five, and say as—

$$Hg\,Cl_2 = 271 : 2\,Fe\,I = 310 :: 35 : 40.$$

That is, thirty-five grains of bichloride of mercury were required to throw down all the iodine, as the biniodide of mercury and that quantity corresponds to forty grains of iodide of iron. The drying and weighing of the precipitate are quite unnecessary steps, though, to follow Mr. Edward Smith's test throughout, we did so, and found an exact correspondence.

We trust that none of your readers will mistake us to mean anything else than that *colour has nothing whatever to do with strength.*

In the *Journal de Pharmacie* (vol. xxxiv., p. 56) we observed an article by M. F. Buignet on the preservatives of iodide of iron, and as he there gives our process for preparing the Glycerina c. Ferri Iodido (first published in your number for June, 1858), and remarks that we do not say anything about the keeping properties of that preparation; we feel called upon, now, to say that, judging from the two samples now before us, which were made eighteen months ago, its keeping properties are apparently unexceptionable. We think that M. F. Buignet is labouring under a wrong impression in believing that attempts have been made in Great Britain to *supplant* the Syrupus Ferri Iodidi with the Glycerina c. Ferri Iodido. We see no reason why the latter should get any preference over the former, unless it be because of the ease, cleanliness, and quickness with which it can be prepared. We think the Syrupus Ferri Iodidi is a faultless preparation when carefully prepared. M. F. Buignet is evidently unaware of the fact that there is no gum in the British Syrupus Ferri Iodidi, and we question much if the French preparation is not the worse for the gum in it.

A few remarkable facts, in opposition to the general opinion that exposure to sunlight is conducive to generation of colour in such preparations, are, we think, worth relating. We have frequently observed that, under certain circumstances, coloured Syrupus Ferri Iodidi is bleached by exposure to sunlight. The sample of Glycerina c. Ferri Iodido of officinal strength, before us, was colourless when newly made, but gained a slight colour in the course of time. By exposure for one day to the sunlight it became colourless again, and was in that state set aside in a shady place. On looking at it the other day, however, we found that

the original pale greenish-yellow colour had returned to it; we therefore again exposed it to sunlight, which again rendered it colourless, and in that state it now is. This sample was sealed up immediately on being made, and the seal has never been disturbed. The other sample of nearly 100 grains in the fluid ounce was at first rather deeply coloured in consequence of want of proper care in its preparation, and we exposed it for many weeks together to the sunlight, which only caused a slight diminution of colour. In this state we set it aside in a shady place, along with the other sample, where it remained undisturbed till the other day, when, to our surprise, we found it was colourless! Can the glycerine itself have the property of absorbing the colour under peculiar circumstances in the course of time? Or did the preparation store up sunlight during that long exposure, and did that stored up sunlight slowly act in the shade? This last sample was never sealed—only loosely corked.

A note was also read, which had accompanied a specimen of syrup of iodide of iron, from Mr. J. W. Williams, of Giltspur Street. The author stated that the syrup had been made according to the process of the London Pharmacopœia in April, 1858, and it had been since that time exposed to diffused sunlight without undergoing any change of colour. The only precaution adopted was to fill the bottle and exclude air.

Mr. Waugh was not aware that any real difficulty had been experienced—either in making or keeping syrup of iodide of iron. It required a little care certainly, but they all knew, or might easily learn, how to get a perfectly good syrup by the process of the Pharmacopœia, and he never found any difficulty in keeping it for a reasonable time in a fit state for use.

A Member remarked that it generally became a little coloured when kept in bottles only partly filled.

The Chairman thought it would be an advantage if, in the process of the Pharmacopœia, a smaller proportion of iodide of iron was ordered, as it would then be less liable to undergo change of colour when kept in bottles with access of air.

Mr. Bottle inquired whether the method, which was suggested some years ago, might not be adopted with advantage, of keeping an aqueous solution of iodide of iron of suitable strength with a coil of iron wire in it, and adding a certain proportion of this to simple syrup when syrup of iodide of iron was wanted. In that way the solution might be kept without change of colour.

The Chairman did not think that method of preparing the syrup would be found to present any advantage over that now adopted according to the Pharmacopœia.

Dr. Redwood said the method referred to by Mr. Bottle was subject to one decided objection, which was that solution of iodide of iron, the colour of which was preserved by the presence of iron wire, did not remain uniform in strength, as part of the iodine was precipitated with the oxide of iron that collected at the bottom of the bottle.

Mr. Daniel Hanbury had noticed that authors, including those whose communications had just been read, mentioned this syrup as being colourless when in a perfect state, whereas it had a slight tinge of green.

Mr. Haselden had found that by keeping the syrup in small bottles, so that it should not remain long in a partly filled bottle, and by covering the bottles with blue paper so as to exclude light, it could be kept without any material change.

Mr. Bottle said it was a very common practice to cover bottles with blue paper when they contained substances that were liable to be injured by the action of light, but he would suggest that yellow paper might be used with better effect, as blue paper allowed the actinic rays to pass while yellow paper would absorb them.

Dr. Redwood observed that, although for such a substance as iodide of iron yellow paper would probably be better than blue, yet he doubted whether a yellow covering could be adopted with advantage for the preservation of all substances used in medicine which were affected by light. The green leaves and coloured flowers of medicinal plants were among the substances most frequently preserved in coloured bottles or bottles covered with paper, and in these cases it did not appear that the blue ray was always that most productive of change. Sir John Herschel had found that those rays the colour of which was complementary to that of the vegetable matter acted upon, were generally most effective in producing change. Even this, however, was not invariably the result, and no simple rule could therefore be laid down. The subject was a very interesting one, especially to the Pharmaceutist, who would find much that might be turned to practical account in Sir John Herschel's paper in the Philosophical Transactions.

SYRUP OF GINGER.

BY MR. WILLIAM Y. BREVITT.

At the last Pharmaceutical Meeting a paper was read on the above subject, sent by Mr. Barnard S. Proctor, in which he states his experience in preparing syrup of ginger by the process ordered in the London Pharmacopœia. The results that attend the London Pharmacopœia's process, when he prepares it, are so very different to those I obtain myself, that I have thought it necessary to mention it.

After the infusion has stood four hours (not twelve, as Mr. Proctor states), I decant it on a paper filter, when I find it passes through *quite bright and tolerably quick*. I filter the *pressed* liquor through a fresh paper, which I necessarily find takes rather a long time, but never ceases altogether. The sugar being dissolved in the infusion by heat, the scum removed from the surface and the syrup allowed to cool, I add the requisite spirit, when I invariably produce a syrup as good as it is possible to be wished for either as regards aroma, pungency, or appearance.

It was only a few days ago that I saw some at a neighbouring surgeon's that I had prepared more than twelve months ago, and was glad to find that it was as good as when first prepared, and without any deposit.

Mr. Proctor further states that his results with syrup of tolu are almost identical—here, again, I beg to differ—whether the solution of the tolu be obtained by boiling, as ordered in the London Pharmacopœia, or by digesting a temperature of about 120°, I can, without any trouble, have a bright solution, and consequently a bright syrup, colourless, and of a fine balsamic taste and odour.

That we do not extract all the pungency of the ginger, I fully admit, but that being the only fault I have to find, I shall certainly not be induced to alter the London Pharmacopœia mode of preparation.

Darlington Street, Wolverhampton, Nov. 5, 1859.

The following note relating to the same subject, addressed to Prof. Redwood by Mr. Proctor, of Newcastle, was also read:—

Grey Street, Newcastle, Dec. 2, 1859.

Dear Sir,—I hope you will not feel that I am trespassing upon your good nature in asking you to read a few remarks for me at the approaching Pharmaceutical Meeting, in reply to some objections to my process for syrup of ginger, which have been raised by Mr. Whipple.

He thinks I have paid too much attention to appearances, and too little to the qualities of the syrup in other respects. I am not conscious of any useful quality having been sacrificed to appearances, and if it be made evident that my syrup is in any respect deficient in the qualities which it ought to possess, I will be happy to give it further attention.

It is sufficiently evident, without any argument on my part, that the use of syrup of ginger is simply that of a flavouring material, consequently that syrups having equal flavouring properties, are, *citeræs paribus*, of equal merit, and that my syrup, if it does not contain so much essential oil, is not *necessarily* the worse for its loss.

Mr. Whipple urges strict adherence to the Pharmacopœia, and I do the same, but that can be no reason why the Pharmacopœia process should not be changed; on the contrary, one good reason for adopting a new formula is, that the present process is one which tempts deviation, and it may be replaced by one which will not do so.

But, independently of this, there *must* be a change either in the London or Dublin process, if the new Pharmacopœia is to be a national work. I should not have suggested a new formula if either that of the P.D. or of U.S. had yielded a satisfactory product.

Mr. Whipple thinks my syrup should be called a "Fluid Soap of Ginger." Had he taken the trouble to calculate, he would have found that the quantity of potassa used (*i.e.* 10 minims of the liquor, equal to about 0.543 grains of anhydrous potassa) is $\frac{69}{1000}$ of a grain less than what would be required to precipitate the whole of the alumina (0.612 grains of anhydrous potassa being required to combine with the three equivalents of SO_3 contained in the 2 grains of alum); consequently there is no free alkali to exert a saponifying action upon the ginger. I considered an excess of alkali objectionable, and therefore carefully avoided it.

Yours faithfully,

Prof. Redwood. BARNARD S. PROCTOR.

NOTE ON THE PREPARATION OF AROMATIC CONFECTION.

BY MR. JAMES STOCKEN.

THE author recommends that an alteration should be made in the formula for this preparation; infusion of saffron evaporated to the consistence of a syrup being substituted for powdered saffron, and the oils of nutmeg and cloves being substituted for those spices. He also recommends the substitution of precipitated chalk for prepared chalk. The following formula is suggested, the quantities being expressed in avoirdupois weight.

Take of	Powdered Cinnamon	3 ounces
	Oil of Nutmegs	½ ounce
	Oil of Cloves	¼ "
	Powdered Cardamom Seeds,	¾ "
	Saffron	3 ounces
	Precipitated Chalk.....	28 "
	Powdered Sugar.....	36 "

Make an infusion of the saffron and evaporate it to a syrupy consistence, then mix this with the chalk and dry it, afterwards add the other ingredients.

NOTE ON ARSENIC IN TRISNITRATE OF BISMUTH.

BY MR. JOHN MORLAND,
Analytical Chemist.

DURING the progress of Dr. Smethurst's trial the presence of arsenic in commercial trisnitrate of bismuth was brought forward by the witnesses for the prisoner to account for the arsenic found by Dr. Taylor in one of the evacuations. Wishing to repeat the examination of trisnitrate of bismuth for arsenic, I obtained two samples of it from Pharmaceutical Chemists in the City; in both I found traces, though but slight ones, of arsenic. I was, however, surprised to find that both the samples contained chlorine; in one it corresponded to 72.5 per cent. of subchloride, in the other to 19.2 per cent. As the subchloride contains a larger per-centage of bismuth than thes ubnitrate, it can scarcely be economical to substitute it for the latter; probably the finer powder obtained, together with the more easy solution of bismuth in aqua regia than in nitric acid, is the nducement. I understand that a subcarbonate is also prepared in London.

The above fact is not without a bearing on the presence of arsenic in the bismuth preparations, as arseniate of bismuth is barely soluble in nitric acid, whilst in hydrochloric acid it is freely dissolved, and reprecipitated with the subchloride on the addition of water. To prove this, I prepared subnitrate and subchloride of bismuth from metallic bismuth, to which a large quantity of arsenious acid had been added; the solutions, as ordered by the Pharmacopœia, were both filtered before precipitation by water, and the resulting subsalts tested for arsenic; there was only a trace in the subnitrate, whilst in the subchloride it was abundant, as also in subcarbonate prepared from the chloride.

17, *Eastcheap, November 19th*, 1859.

Mr. John Huskisson, jun., observed that, considering the way in which subnitrate of bismuth was usually prepared, there could not be more than a mere trace of arsenic in it. The metallic bismuth was first roasted at its fusing point, during which process the arsenic, which volatilizes at about 367°, was driven off. The purified bismuth was then dissolved in nitric acid, and the nitrate obtained in crystals. These crystals were afterwards decomposed by the addition of water, and the subnitrate was thus obtained, while any arsenic that might have escaped volatilization in the roasting would be left in the mother liquor from which the subnitrate was precipitated.

Dr. Redwood thought the process described by Mr. Huskisson was better than that given in the Pharmacopœia, and he approved of using the crystals rather than the acid solution of nitrate of bismuth for precipitating with water, as the product would be less liable to variation. He did not think, however, that the roasting of the metal could be depended upon for the removal of the whole of the arsenic, nor did he consider the subnitrate, in whatever way prepared, a satisfactory preparation. He thought it might with advantage be replaced by the subcarbonate.

Mr. Morland inquired of Mr. Huskisson how he accounted for the presence of chlorine in the subnitrate of bismuth of commerce.

Mr. Huskisson said there were two compounds of bismuth prepared by manufacturers—the subnitrate or trisnitrate, which was used in medicine, and the oxychloride, for the preparation of which every manufacturer had a process of his own, and of which large quantities were used in the arts, as an ingredient in enamel, as a cosmetic, and in the preparation of sealing-wax. As the oxychloride was more expensive than the subnitrate, he thought its substitution for the latter must have been the result of accident, or probably the person selling it thought, as it was not ordered for medicinal use, that it was required as a pigment, and therefore that the oxychloride was the sort wanted.

The Chairman confirmed what had just been stated with reference to the oxychloride of bismuth, which, he said, was far more extensively used than the subnitrate, especially in the manufacture of white sealing-wax. He thought the subcarbonate of bismuth a better preparation than the subnitrate, and less likely to be impure.

SALE OF DANDELION COFFEE.

The Chairman drew the attention of the meeting to the subject of dandelion coffee, with respect to which some correspondence had recently taken place between the Secretary to the Society, the Board of Inland Revenue, and one of the Members of the Society in the country. It was important that their Members should know to what extent the sale of dandelion coffee was affected by the Excise regulations, and the Secretary had, therefore, at the instigation of a country Member, applied to the Board of Inland Revenue on the subject. It appeared that coffee, either alone or mixed with other substances, could not be sold, as such, without a licence, and that it was illegal to mix any substance with coffee without the sanction of the Board of Inland Revenue, which sanction had not been given for the admixture of dandelion with coffee. Those persons,

therefore, who sold a mixture of coffee and dandelion under the name of Dandelion Coffee, rendered themselves liable to a penalty, but if they omitted the coffee, as many did, and sold the dandelion root alone under the name of dandelion coffee, the law would not interfere. Some persons objected to sell dandelion root without any admixture of coffee, under the name of dandelion coffee, and if it should be thought by Members of the Society that it was desirable to obtain the permission of the Board of Inland Revenue to mix dandelion and coffee together, and sell such mixture as dandelion coffee, the Council of the Society would probably, if applied to, take steps for obtaining such permission.

[A further notice of this subject will be found at page 346.]

GAS BLOW-PIPE.

Mr. L. J. Paine, of 47, Great Russell Street, Bloomsbury, exhibited a blow-pipe suitable for use by Dentists and others. It consists of a small bellows, the flexible parts of which are made of vulcanized india-rubber, which is placed on the ground and worked by the foot, while an elastic bag equalizes the blast of air which is directed into the interior of a solid flame of ordinary coal-gas. The whole apparatus is convenient for use, and very inexpensive.

PHARMACEUTICAL MEETING, EDINBURGH.

A Meeting was held in George Street Hall on Tuesday evening, the 20th of December, at nine o'clock;

MR. RAIMES, PRESIDENT, IN THE CHAIR.

The President said he regretted having been absent from the previous meeting, but felt assured that his place was ably filled by the Vice-President, who, in his opening address, had alluded to the great loss the Society had sustained by the death of Mr. Jacob Bell. On the present occasion, he said, it was his painful duty to allude to another death, by which they were deprived of one who was personally known to many present, and who was honoured and esteemed by all. Although comparatively young in years, Professor George Wilson had attained to a position which indicated the great resources of his mind, almost too strong for the feeble body it inhabited. His connexion with the Pharmaceutical Society, as Honorary Member, had led to their being favoured with some valuable contributions on subjects connected with his favourite study, and not the least interesting of his communications was that which constituted his last public lecture, which was delivered in that room. Much as his loss would be felt by the scientific world, and by the University in which he was so distinguished a professor, it was his private friends who would miss him the most. To them his genial temper and many virtues had endeared his memory, and would afford enduring reminiscences. In every movement having for its object the public welfare, Professor George Wilson was among the foremost, his life having been devoted to science and benevolence; and abundant proof of the universal respect in which he was held by his fellow-citizens, was afforded by the last tribute of respect which was shown on the day of his funeral by the civic authorities and numerous societies in Edinburgh.

MANUFACTURE OF WOOD AND WAX MATCHES.

Mr. John Mackay read an interesting paper on the present mode of manufacturing wax and wooden matches, with an especial reference to a visit he had lately made to a large manufactory successfully carried on by Mr. Letchford, of Old Montague Street, London. After referring to the courtesy experienced from Mr. Letchford, Mr. Mackay, as an introduction, glanced at the various modes from time to time introduced for obtaining an instantaneous light, and then proceeded to describe the size and appearance of the work he had seen. He stated the manner in which wood was cut up to produce the necessary foundation for the common wooden match, and having, by various specimens, illustrated the process of sulphur and stearine dipping, he described the way in which the matches were then laid in grooved pieces of wood, placed in frames, each made to contain 3000 matches, and thus rendered ready for the dipper. Having named the composition and nature of the

igniting composition, and the manner followed in dipping, drying, emptying frames, and boxing, he gave a description of the wax match manufacture, from the cotton in ball up to the time of the match being placed in boxes, ready for home or foreign consumption.

In the course of his remarks he adverted to the proposed introduction of amorphous phosphorus for the preparation of matches, which would, in every way, be more safe than the match prepared with ordinary phosphorus; being less liable to ignite, as well as being non-poisonous, and therefore free from the chance of destroying children, who have more than once been killed by inadvertently sucking the common match. Mr. Mackay stated, notwithstanding the objection made by M. Personne regarding the certainty and rapidity with which the amorphous preparation changes when exposed to a moist atmosphere into *phosphorous* and *phosphoric* acids, this fault could be overcome, but it had been found from actual experiment that it required 3 lb. of this preparation to go as far in producing the same amount of the igniting composition as 1 lb. of ordinary phosphorus did, and therefore the commercial difference was so great, and so completely counterbalanced the non-poisonous peculiarity of the other, that, at the present day of great competition in match-making, the idea was almost abandoned of introducing the amorphous, or red phosphorous, in this branch of trade. Besides, it had also been found that when due regard was paid to ventilation, the occurrence of the dreadful disease to the jaws of those engaged in the work, had been completely stopped. On this point, Mr. Mackay gave the result of observation and conversation with some who had been engaged daily in the work for fifteen or sixteen years, and who had never known a day's illness or absence arising from anything connected with phosphorus, used so largely in the manufactory.

Mr. Mackay, in concluding his paper, referred to the supposed quantity of phosphorus now consumed in this country as well as on the Continent. He also contrasted the present demand with that existing some years ago. Thus the quantity imported into Great Britain in 1844-45, at a time when all our supplies came from foreign countries, was only 125 cwt., a fact undeniably proved by the duty which was then paid upon the article. The quantity now consumed in England alone is estimated to be upwards of fifty tons annually—one establishment in England consuming for match-making no less than five tons every year. A great variety of matches were shown, and special reference made, and samples submitted, of the French match made after M. Canouil's patent, some statements regarding which appeared in last journal. Mr. Mackay closed by stating the supposed, and in some cases known, daily product of the manufactories in England and elsewhere, and which amounted to a large number of millions as the daily manufacture of these small and, in some respects, insignificant little articles.

MEANS FOR RENDERING COTTON, LINEN, &c., NON-INFLAMMABLE.

Dr. Macadam stated that the many cases which had occurred lately of the cloth of female dress taking fire, numbering not less than twelve in one week, had aroused the attention of the public to the importance of adopting measures for rendering cotton and linen as non-inflammable as silk and wool. Foremost in the inquiry, Her Majesty the Queen was pleased to direct the notice of the Master of the Mint to the subject, and requested that scientific research should be made as to the best means of preserving cloth from taking fire, and thus arresting in its first stage that dreadful calamity of being burned to death. In the experiments instituted at previous periods, soluble glass, alum, and borax, or mixtures of these substances, had been employed with partial success. In the Theatre Royal, Munich, the drop and other scenic representations on canvas were coated with a soluble glass, which forms a protecting varnish, which necessarily resists fire. The various forms of alum and borax had also been used, but the protecting influence of either of these substances was not great, and in experiments made by himself, he had not found cloth treated with these salts to be so non-inflammable as was desirable. The material which appeared to answer the purpose best was the common and cheap salt, the sulphate of ammonia, which was first recommended by Dr. Smith, of Manchester, and had recently been made the subject of a patent by Messrs. Versmann and Oppenheim. Dr. S. M. proceeded to describe the processes adopted by the above-named chemists, a full account of which will be found at page 385.

Mr. Mackay having shown and explained the atmospheric clock, the meeting adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Fourth Meeting of the Session was held in the Royal Institution, Nov. 24, 1859;

THE PRESIDENT IN THE CHAIR.

Mr. J. B. Entwhistle was elected a Member, and Mr. J. B. Betts was elected an Associate.

ON THE THEORY OF THE CONSTRUCTION OF BALANCES, AND ON A NEW CHEMICAL BALANCE.

BY MR. ISAAC B. COOKE.

It is the fundamental law of Chemistry, that all the various kinds of matter of which the surface of this globe is composed combine together, each in its peculiar, but all in fixed and invariable proportion *by weight*. The chemical formulæ of composition, the principal theories of the science, the future progress of discovery, the economy of processes in the arts, are all dependent, to a great extent, upon analytical experiments in which the exact determination of weight is all important.

The pestle, mortar, and other implements have been on various occasions adduced, seriously or in burlesque, as emblematical of the Chemist's occupation. But the balance is the essential instrument which exact chemical science will always recognize as its appropriate and characteristic symbol. It is absolutely essential alike for professor and student, for experimental investigation and for commercial analysis, to possess an apparatus of great sensitiveness and accuracy for estimating the weight of the substances which he combines into, or eliminates from, a compound.

Those who are so dependent upon the use of the balance, ought to be thoroughly conversant with the principles of its construction and employment. Others among you are probably more competent than I to explain and illustrate this subject, but I have been invited by your officers to describe to you an invention of my own which, in certain cases, I am inclined to recommend to Chemists, as an available substitute for the costly and delicate pieces of mechanism which the good fortune of the more prosperous enables them to obtain with little comparative strain upon their resources, but which are attainable with difficulty by others of less ample means. I was also requested to preface the description of that invention by a few remarks on the general theory and use of the various apparatus employed for the estimation of weight. I beg you to accept my apology, if, in my wish to be clear, you find me entering into more elementary detail than is at all necessary for the majority of those present.

Weight is the tendency possessed by all matter near the surface of the earth to move, when unrestricted, in a direction towards the earth's centre. Its magnitude is estimated by comparing the effects of this tendency, produced by the substance whose weight is required, with the similar effects of substances whose weight have been previously ascertained. The comparison is effected by three principal methods:

1st. By the assistance of a lever of the first order. That is, of a lever, the fulcrum of which is situated somewhere between the point of application of the weight and the power.

2nd. By the flexure or tension of a spring, or other elastic substance.

3rd. By the amount of displacement of a certain fluid.

We confine ourselves this evening to the consideration of the employment of the lever. And this method divides itself under two heads, according as the fulcrum is, or is not, in the centre of the lever.

The first head comprises only the balance, properly so called, and the following are the principles of construction considered essential to its perfection :—

1st. *The two arms of the lever, called the beam of the balance, must be of equal length.*

The condition of equilibrium of a lever requires that the product formed by multiplying the weight on the one side, by its distance from the vertical line passing through the centre of motion, should equal the similar product of the weight into its distance from the same vertical line on the other side. Now, if the weights which constitute one of the factors in each of these equal products are required to be equivalent, then the distances which constitute the remaining factors must, of

necessity, be also equal to each other. Therefore, it is essential for a true balance that the substance to be weighed should be hung from the beam, at the same distance from the centre of motion as that at which the weights are hung, but on the opposite side. To illustrate the importance of this condition of equal arms, suppose a balance having a beam twelve inches long, constructed with the view to indicate a difference in weight of $\frac{1}{100}$th grain, with a weight of 1 lb. or 7000 grains in each scale. Suppose that inadvertently one arm of the beam has been made $\frac{1}{100}$th inch longer than the other; $\frac{1}{100}$th inch is an interval almost imperceptible to the unassisted eye, but this defect would cause an error of 70 grains in the lb., an error 7000 times as large as the smallest magnitude intended to be correctly given. By a system of double weighing it is possible to ascertain the correct weight by a balance thus defective. But, besides entailing more than double trouble, the result is liable to be vitiated by possible errors of calculation, in addition to those of manipulation.

The 2nd condition insisted upon, is—*That the beam, when suspended with its empty scale pans, should remain horizontal, the weight of the instrument itself being equally distributed on each side of the centre of motion.* This is, however, of less importance than the first condition, as the error admits of obvious and easy compensation before commencing to weigh. Fine balances have a provision for making this compensation.

3rdly. *The two points of suspension of the scale pans, and the centre of motion of the beam, must lie in the same straight line.* By this contrivance is secured the close approximation of the centre of gravity to the centre of motion, and as that approximation is the condition the most essential to the sensitiveness of the balance, it may fitly receive in a popular description some fuller explanation.

Suppose a substance freely suspended from any point of its surface, it will settle in a certain position of equilibrium, and as often as its point of suspension is changed, it will take up a new position of equilibrium. Now there is *a point* somewhere in the interior of the substance, into which, if the weight of the whole mass were concentrated, each successive mode of suspension would retain unaltered its former position of equilibrium. That *point* is called the centre of gravity of the substance, and in case of free suspension, is always found in the vertical line passing through the centre of suspension. If it be situated in this line *above* the centre of suspension, the body is in a position of unstable equilibrium, and the slightest movement to either side will cause it to continue its motion with unceasing velocity until its centre of gravity arrives again at the vertical line, but below the centre of suspension. Of course the momentum the substance has acquired in falling will carry it beyond this point, but with diminishing velocity. At a certain height on the opposite side the momentum will be all expended, the motion will be reversed, and oscillation will continue in smaller and smaller arcs on each side the vertical line, until, from the effects of friction and the resistance of the air, the substance finally settles in a position of stable equilibrium, with its centre of gravity in the vertical line, but now below the centre of suspension. If the centre of gravity be coincident with the centre of suspension, it is evident that no motion of the body round the latter would disturb the position of the former, and while the coincidence is maintained, the body will remain at rest indifferently in any position in which it may be placed.

It is evident, then, that if the centre of gravity of a balance be either above, or in, the centre of motion, the effect of the slightest inequality of weight which could produce motion would be to upset the balance, without impressing upon it any tendency to return to its original position ; and oscillation about that position would be impossible. But the state of oscillation is thought desirable, inasmuch as it affords a rough indication to the operator of the amount of excess or defect in the weights employed to produce equilibrium. It is therefore necessary that the centre of gravity should be situated *below* the centre of motion. Oscillation is, however, produced by a smaller force, and sweeps through larger arcs, in proportion as these two centres are brought near to each other ; for then the mass is distributed in nearly a balanced condition around the centre of motion ; and the distance moved through by the centre of gravity is small in comparison with that traversed by the ends of the beam. Therefore the force which must be applied to the end of the beam to produce motion is comparatively small. But when the centre of gravity is much depressed, there is a large unbalanced mass below the centre of motion, and its relative motion is also considerable ; the oscillations are therefore small, and require a large weight added in the scale pan to produce them. As weight always acts

only in the plumb line, and as the scale pans, being freely suspended, always hang vertically, their whole weight, with that of their contents, may be considered as acting only at the points of suspension; and if these are in the same straight line with the centre motion, the two centres would coalesce, and oscillation would be impossible, provided the beam itself were without weight. It is easy, however, so to construct the beam as to correct this condition, and to depress to as small an extent as desired, the centre of gravity of the whole. In fine balances, provision is made, by the rise or fall of a screw upon a vertical wire attached to the centre of the beam, to alter at will the position of the centre of gravity. When the pans are loaded, as the beam can scarcely be made wholly inflexible, a further depression of the centre of gravity is caused, and this is the chief reason why the sensitiveness of a balance diminishes as the weight to be determined increases.

The 4th condition is—*That the friction at the points of suspension be as little as possible.*

The mode of mounting by axle revolving in a socket like a wheel, even though the axle be very small, would cause far too much friction even for the coarser kinds of balance. The expedient adopted is that of a knife-edge poised upon a plane surface. And both edge and surface are commonly, in fine balances, formed of agate, as being the hardest available substance. Perfection requires that the surface should be unyielding, and perfectly level and smooth, and that the knife-edge should lie undeviatingly through its whole length in a mathematical straight line. Of course this perfection is only approximately attainable, as the most polished surface is only smooth relative to our perceptions. And the knife-edge, which is sensibly true, is doubtless really a surface, in which the molecules, separated by pores, do not succeed each other in a line wholly without breadth. The imperfections arising from these sources, however slight, cause errors which increase in proportion to the weight to be tested.

Lastly—*The sensitiveness of a balance, other things being equal, is proportional to the length of the beam.* But the weight and flexibility of a long beam, and the diminished convenience for operating, in having frequently to move from one extreme to the other, place obvious limits to this source of improvement.

Balances are frequently made to indicate differences of $\frac{1}{100}$th grain, with 1000 grains in each pan, or $\frac{1}{1000}$th grain with 500 grains, and sometimes to weigh much larger amounts to the same degrees of accuracy. The utmost care of the most skilled workmen is necessary to ensure their efficiency. They must be enclosed and protected from the influence of moisture and other vapours and gases. They are liable to injury from any manipulation which is not skilful and delicate, and are expensive pieces of apparatus.

The second case of the employment of the lever, includes the steelyard and the large weighing machines. The steelyard is only used for coarser purposes. In the balance the arms of the beam are of equal length, and a large number of weights is employed, varying from $\frac{1}{1000}$th grain to half a cwt. But the steelyard is a contrivance by which one weight is made to serve instead of many, by having arms to the beam of unequal length. Since equilibrium is attained with the equality of the products of weight into distance, on the opposite sides, very different weights hung on the short end may be balanced by a single weight placed at different distances on the longer arm. In the large machines, loaded carts, &c., are wheeled into a platform fixed on to the short arm, and the longer arm is broken up into a series of levers, acting on each other; on the last of which a few weights are placed at a fixed point, and the exact equilibrium is then effected by sliding a small weight along the lever, which is graduated.

The instrument which I have specially to describe is the result of an attempt to obtain a degree of accuracy than which greater is not required except in extraordinary cases, with little cost either of labour or material. Like the balance and steelyard, it is also a lever of the first order. But three out of the five conditions enumerated above as belonging to the balance, are neglected in its construction, and the objects sought by these conditions are attained by other means.

Its beam consists of a barometer glass tube, which, if only strong enough to bear the weight with which it will be loaded, may be of any convenient length. Two peculiarities of the instrument are here important. Whether you weigh by it the smallest fraction of a grain or the greatest weight which it is intended to bear, it is

always loaded to precisely the same extent. The flexure of the beam is therefore always the same.

Again, the operation of weighing is conducted wholly at one end of the beam, and the inconvenience of having, while operating, to move frequently from one end to the other of a long balance, is obviated. There is then no reason, except economy of space, why the glass tube for the beam should not be say three feet in length, and this is an important element in its sensitiveness.

A piece of glass tube, or better, of solid glass cylinder, about four inches long, which I call the suspension piece, is tied to the beam tube, at about the middle point of each, and as nearly as can be estimated by the eye at right angles to each other. A few turns of fine iron wire will suffice to secure the joint, if covered afterwards by shellac melted over it from a gaslight. Two other tubes, or, which is better, solid cylinders of glass, called the supporting pieces, each about two inches long, are cemented longitudinally and horizontally upon the shelf or board destined to support the balance, at a uniform distance from each other of about one inch and a half. Their diameters must be equal to each other, but greater than that of the beam tube, so that when the suspension piece is laid across them, the beam tube lying between and parallel to them, may be raised at its centre one-quarter of an inch at least above the board. Instead of being of large diameter, the supporting pieces may be raised to a sufficient height by slips of wood of equal thickness. Both the suspension and the supporting pieces should be selected of true form and good polish, and to the extent in which they approximate to perfect hardness, soundness, and smoothness, to that extent do they also approximate to the *perfect* mode of suspension—namely, that of contact only by mathematical points. The same materials being applied with equal skill, I suppose this mode of suspension to be superior to that of a knife-edge upon a plane. For though the whole weight of the balance and contents is in the one case concentrated upon two points, and in the other is diffused over two lines, and any injurious change of form will be in proportion to the pressure exerted, yet the substance of even glass tube appears sufficiently impenetrable to sustain the weight proposed to be put upon it, without yielding so much as to prevent the highest desired degree of sensitiveness. And the true form is much more easily obtained in the case of the three cylinders, than in that of the knife-edge and planes, inasmuch as the physical line of the knife-edge contains as many possible sources of error as it contains physical points.

The sensitiveness we do obtain in fine balances is probably far in advance of the present limits of errors in our chemical manipulation. So long as we are liable to the loss of some hundredths, or even tenths, of a grain in our processes of melting, dissolving, precipitating, washing, filtering, drying, and calculating, it is of little value, except in certain peculiar cases, to be able to weigh to the $\frac{1}{1000}$th of a grain.

The operation of weighing being conducted wholly at one end, a peculiar form of scale pan is required. It is convenient to have three tiers of scale pans hung at suitable distances one above another, in a pyramidal form, by the same three silk threads. The lowest one is intended to receive the substance to be weighed. The middle one in size and position to contain the larger weights, and the platinum weights of less than ten grains are to be deposited upon the upper one. The whole is suspended by a bent pin from a loop formed at one end of a short silk thread, which, passing up through a hole in the shelf, is cemented by a drop of melted shellac upon the upper surface of the end of the beam. A slight notch is formed with a file upon the vortex of the end section of the beam tube for the silk thread to lie in, and the end section is ground away below so that the thread may hang freely from the upper part without contact at any other point. The thread also requires to be guarded from contact with the sides of the hole in the shelf. The best plan, perhaps, is to make the hole about one inch square, but afterwards to cover over the greater portion by four slips of window-glass so as to leave only a small clear hole for the silk to pass through. If the hole be left large, a current of air is usually established upwards, which interferes with the delicate indications of the balance.

The centre of motion of the balance is the central point of the mid-section of the suspension piece, and as the whole of the beam and the suspension point of the scale pans, are situated much below this centre, some provision is required considerably to raise, as well as nicely to adjust, the position of the centre of gravity. This provision is found in the mode in which the compensation is applied at the other end of the beam.

A table of window-glass about one inch and a half square is cemented firmly by melted shellac upon the upper surface of the compensation end of the beam. Upon this are similarly cemented, side by side standing upright, two glass tubes, the dimensions of which must be proportioned to the capacity of the balance. If it is intended to weigh 1000 grains, one of the tubes should be about three-quarters of an inch diameter and the same in height, and the other a quarter of an inch diameter and from four to five inches high.

Two pieces of sheet copper are fastened on to the shelf under the beam, one near each of its ends, and the side of each piece nearest its end of the beam is slightly turned up to serve as a rest, so that when the beam is fully loaded, and the compensation end is in contact with its rest, the weighing end may be separated from its rest by about $\frac{1}{20}$th of an inch. If the under surface of the beam is blackened about this point by a slight covering of melted shellac, the separation from the copper rest shows very distinctly against a white background. The distance between the centre of the beam and the weighing end is marked out on the surface of the shelf into ten equal parts; and the balance is now ready for adjustment.

Put into the upper scale pans about two-thirds of the sum of the weights with which they are intended to be usually loaded. The small weights in the upper pan need not be of a lower denomination than $\frac{1}{10}$th grain, and a platinum rider weighing $\frac{1}{10}$th grain is provided to sit on the beam, and by moving over one division marked on the shelf, indicates a difference of $\frac{1}{100}$th grain. Pour into the taller vertical tube at the compensation end dry pure mercury until the weight at the other end is counterbalanced. It will now probably be found that the high column of mercury will have raised the centre of gravity too high, which will be known from the beam remaining on its rest at either end indifferently, as it is placed. Add weights gradually in the pans, pouring mercury into the wider vertical tube to compensate, and now and then make the compensation exact by the use of the small weights and rider, until it is found that the centre of gravity is unduly depressed, which is known by the beam fluctuating indecisively without settling on either rest. A little more mercury must now be added to the taller tube. In this way it is easy to effect the compensation so accurately, that the centre of gravity shall so slightly overtop the centre of suspension as to cause the beam to set decidedly at the weighing end when the rider is over a certain division on the shelf, and as decidedly at the other end when the rider is moved over one degree towards the centre. When this is accomplished, and all the weights intended to be used are deposited in the scale pan, the balance is ready for operating.

Place the substance to be weighed in the lowest pan, remove first from the middle pan, and afterwards from the upper, weights sufficient to restore equilibrium, making the final adjustment by moving the rider towards the centre. The sum of the weights removed, together with the number of divisions passed over by the rider, reckoned as $\frac{1}{100}$ths of a grain, will be the weight required.

The balance will require a slight readjustment for every considerable alteration of temperature; inasmuch as the expansion and contraction of the mercury will tend to raise or depress the centre of gravity. One or two drops of mercury, transferred by a small pipette from one tube to the other, will suffice this end.

In order to commend the use of this simple instrument, it is not necessary to depreciate others. To those chemists, whose ample means justify them in superadding ornament to use in their laboratories, there are few worthier objects of investment than those splendid instruments which the best modern skill has constructed for the estimation of weight. But for operators, whose object is the attainment of a certain moderate degree of accuracy with the smallest expenditure of means, it is believed that a desideratum is here supplied. The advantages offered by the instrument may be summed up as follows:—

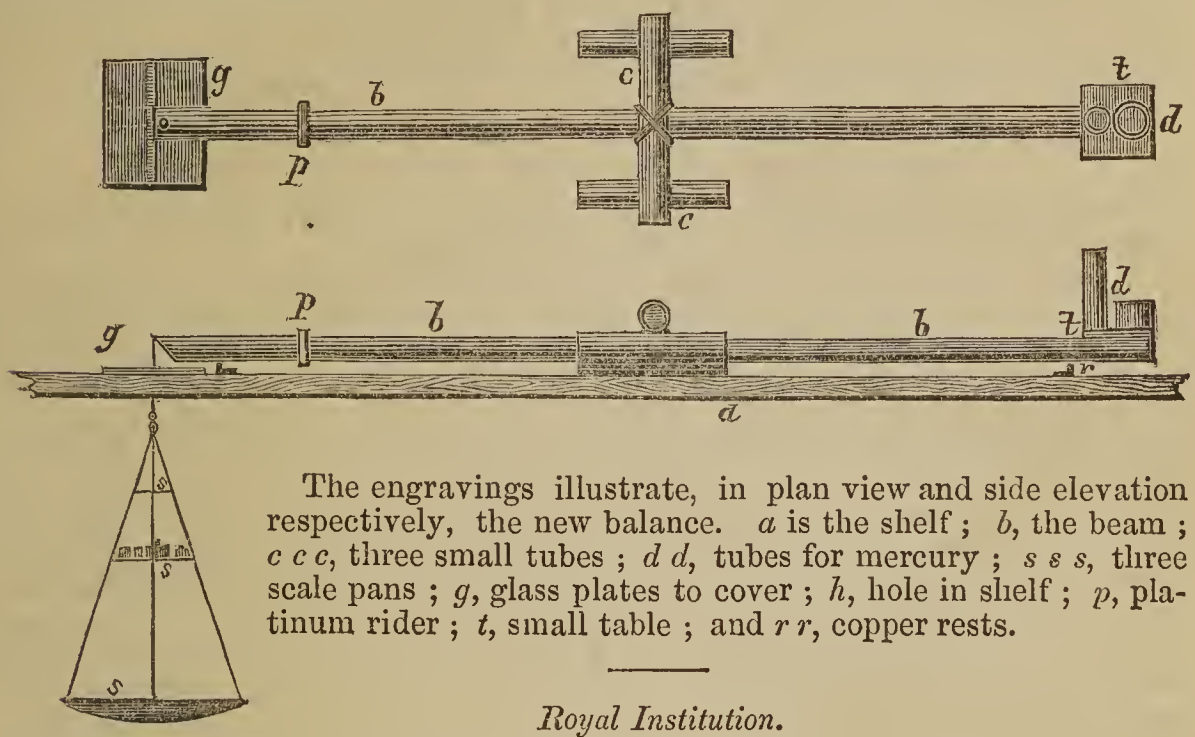
It is easily constructed. The whole may be completed by ordinary skill, without professional help, in the course of a couple of hours.

It is cheap. The cost of the balance to weigh one pound may be stated thus:—The mercury, 3*s.*; glass tubing, 1*s.* 6*d.*; board and supports, 1*s.* 6*d.*; scale pan and copper rest, 6*d.*; total, 6*s.* If only 1000 or 1500 grains are required to be weighed, the cost is diminished by that of the mercury saved.

It is not liable to injury. Knife edges are difficult to preserve in a perfect condition. Brass surfaces are subject to rust. Delicate mechanism in unskilled hands may easily be put out of order, but the materials of this balance are proof

against vapours of water, sulphur, or acids, and when broken are replaced with little cost or trouble.

The operation of weighing being confined to one locality; equal sensitiveness with greater as with smaller weights; separation of smaller from larger weights; increased length of beam without counteracting evil; are also perhaps to be enumerated as advantages.



The engravings illustrate, in plan view and side elevation respectively, the new balance. *a* is the shelf; *b*, the beam; *c c c*, three small tubes; *d d*, tubes for mercury; *s s s*, three scale pans; *g*, glass plates to cover; *h*, hole in shelf; *p*, platinum rider; *t*, small table; and *r r*, copper rests.

Royal Institution.

The Fifth Meeting of the Session was held on the 8th December, 1859;

MR. MERCER IN THE CHAIR.

Messrs. G. W. Stephens, of Hereford, and J. Whitworth, were elected Members. Messrs. A. J. McGowan and A. H. Douglas were elected Associates.

Mr. Mercer next read a paper on the method lately proposed for rendering muslins and other light fabrics non-inflammable, referring to the many serious accidents which had occurred lately through ladies' dresses taking fire. Only that day he read in the *Times* an account of a lamentable occurrence at a ball. A young lady, while dancing, went too near the fire, her dress ignited, and she was soon enveloped in flames. Her companions, forgetting that their dresses were of the same inflammable materials, went to her assistance, and the consequence was that they were speedily enveloped in flames also, three of them being but slightly burnt, while three others were seriously injured. Accidents of this nature had become so frequent, that two eminent chemists had been commissioned by her Majesty to make experiments with a view of discovering something that would render the dresses of ladies non-inflammable, and after numerous experiments, they found that tungstate of soda would answer the purpose, as dresses which had been saturated with a solution of it would not ignite. Mr. Mercer exhibited some specimens of muslin prepared with this salt, which, when placed in a flame of gas, could not be made to ignite. He exhibited some specimens of wolfram, tungstate of iron, from Cornwall; ferriferous tungsten, or wolfram; wolfram, tungstate of iron, from Erehnfriedersdorf; and tungstate of lime, with quartz, in a green argillaceous state, from Devonshire; and then explained the method by which the tungstate of soda was prepared, stating that the strength of the solution he had employed was two ounces to a pint of water, but he thought that even a weaker solution would be sufficient. Having illustrated his observations by several experiments, Mr. Mercer said there was still room for improvement, for the tungstate of soda was soluble in water, and a dress would require to be saturated with the solution each time it was washed to render it uninflammable.

Mr. J. Outram read a paper on the state of the carbonic acid in the atmosphere, detailing the results of experiments he made in Manchester last year with Professor Calvert.

The usual vote of thanks terminated the proceedings.

Royal Institution.

Dr. Edwin Lankester, F.R.S., Director of the Food Collection of the South Kensington Museum, &c., delivered a lecture in the Royal Institution, on Friday evening, 16th December, on "Ozone; with Experimental Illustrations of its Nature and Properties—its Presence in the Atmosphere—its Influence on the Health of Towns—its Effects on Animal and Vegetable Decay—its Importance as a Disinfectant—New Ozonometer," &c. There was a large attendance, and the company was graced by the presence of several ladies. A number of medical gentlemen, and also several members of the various learned societies in Liverpool, were present by special invitation from the Council.

THE PRESIDENT, DR. EDWARDS, OCCUPIED THE CHAIR,

and introduced Dr. Lankester as a lecturer who had already made himself well known, and agreeably known, to the people of Liverpool.

Dr. Lankester, who was very warmly received, then proceeded with his lecture, in which he stated that Ozone was a substance that originally attracted the attention of Schoenbein, a distinguished Swiss chemist. He then described the qualities of Ozone, and the experiments necessary to detect its presence in the air. He also showed how ozone may be used to test organic impurities in water and in the air. The whole subject, he said, was one which was still open to much investigation. Referring to organic impurities in water, the lecturer said that a gentleman from Liverpool, some time ago, sent him two specimens of water—one from Rivington Pike, and the other the red-sandstone water. He submitted them to the test of ozone in the form of permanganate of potash, and in the water from Rivington Pike he detected a considerable quantity of organic matter, whilst that from the red-sandstone was entirely free from it.—Dr. Lankester was warmly applauded throughout his able and interesting lecture, and at its close a cordial vote of thanks was accorded to him.

ORIGINAL AND EXTRACTED ARTICLES.

PHARMACEUTICAL EDUCATION, PAST, PRESENT, AND FUTURE.

BY MR. A. F. HASELDEN.

"Bona educatio præferenda claris natalibus."

It was with a mingled sensation of regret and gratification that I perused the admirable address of the late Dr. George Wilson upon the education of the Pharmaceutical Chemist, which appeared in the last number of this Journal; regret at the loss necessarily experienced by the death of so talented and amiable a gentleman, so great an ornament to professional society; gratification at the able construction of his valuable observations. But still, admiring as I did the excellent feeling which dictated them, coupled with the sterling advice, sound remarks and suggestions therein displayed, I could not dispel the feeling or resist being forcibly struck with the conviction that they did not exactly and entirely adapt themselves to the educational career of those who intend following the business of a Pharmaceutical Chemist and Druggist, as now carried on in England, but rather to a class of Pharmaceutists, the education of whom takes its start in the laboratory and not in the shop, and who pay no premiums, but in some instances receive some small remuneration, equivalent, probably, to partial board and lodging.

At the commencement of a new year, when all around seems buoyant and full of hope; when the course is still clear and unfettered; when, however good the past may have been, every hopeful and expansive nature anticipates a still brighter and more prosperous future; when mutual good wishes are scattered freely and without restraint; at such a time a few words upon what have been, to a certain extent still remain, and what it is hoped may be, the future characteristic features of the educational course of every Pharmaceutical

Chemist and Druggist in the United Kingdom, may not be perhaps altogether misplaced or unacceptable from one who commenced his study of Pharmacy in years past—who has had his full share of long hours, rudimental dusting, mercurial trituration, powdering, sifting, pill making, ointment stirring, spirit distilling, and such-like; from one who has at least worked much, if not too well or wisely; one who would gladly see those who may follow him in a calling honourable in itself, and capable of elevating the mind and bringing out its brightest though perhaps latent sparks, do so by a more perfect, more satisfying, and more gratifying process than has hitherto fallen to the lot of many.

Let me now take a brief review of the usual system of training or daily toil, would I could say study, to which the Chemist and Druggist's apprentice of five-and-twenty years ago was subjected, and without this I know not how to draw a comparison between his disadvantages and the advantages it is possible to be enjoyed by a very large portion of the apprentices of the present day. In countless cases of bygone days it would run somewhat thus: at early dawn he rose, in the summer not unfrequently at six, in the winter at seven o'clock—his duty to see the shop opened by the errand-boy or porter, to dust a portion daily of the bottles and pots, the counter, scales, glass-cases, and chairs, and once or twice a week clean the inside of the window, this (as soon as sufficient confidence could be placed in him that he would sell nothing of which he had any doubt), with the occasional disposing of sundry pennyworths already arranged for sale, filled up the time till eight or half-past, when breakfast came *en suite;* his repast concluded, the youthful, and sometimes ardent pupil arrayed himself in neat attire and clean apron ready to perform anything of which he might or might not be capable; as a preliminary, he was shown and gradually introduced to the printed names on the bottles and drawers, and, should his master be inclined to be jocose, he was told that though silent they were eloquent companions, each speaking for itself. He was, by degrees, taught to know the different drugs by sight, but how seldom by the distinguishing structure and feature peculiar to each? As a mode of becoming acquainted with every article on the premises, and its money-value as well as its appellation, he was instructed in some cases to make out a list in Latin with the different aliases in English, with the cost and retail prices attached. But where, alas! were the works on Practical Pharmacy, Chemistry, Materia Medica, and Elementary Botany, which should have filled up the vacant spaces? and they were many; where was the well-instructed Pharmaceutist with mind liberally stored with every needful information who could reply to the questions of the inquiring youth? and the mind of youth, if healthful, is ever full of inquiry until checked by unsatisfactory replies. But, to resume, should a prescription be brought in, he was asked in the absence of the customer to read it, and if he had received his full share of Latin he would probably give a better account of the direction than the articles; possibly, under superintendence, he would be permitted to weigh the ingredients, beat the whole, if a pill, into a mass, and finally divide it. And this species of training had to be repeated day after day, week after week, with mixtures, lotions, ointments, liniments, and every description of recipe or prescription, the intervals to be filled up with weighing and preparing different articles kept ready for sale; and where there was any semblance to a laboratory, a back kitchen or perhaps a covered yard, preparing and pressing tinctures, powdering and sifting, beating pill masses, rubbing mercurial compounds, and distilling sal volatile and spirit of nitre. But where there was one with even this ghost of a laboratory, how many were there who had not even the shadow of such a ghost? In addition to this he was taught to prescribe a little, and thus picked up an uncertain and dangerous knowledge, should it take him out of his depth of the employment of remedial agents, and a limited amount of information respecting their doses and uses. But, I repeat, where was that little library of elementary works which might, and should, have assisted in giving that in-

struction so desirable and requisite to make up the full measure of the required knowledge, and which might have assisted in passing many a weary hour between the partial closing of the shop at nine, or past, until eleven, at which hour he retired to rest? Need I add that the library, or stock of scientific books consisted too often merely of a Pharmacopœia, Hooper's *Medical Dictionary*, and some domestic work upon the treatment of diseases. After paying a premium varying from one to two hundred pounds, five, and sometimes seven years of such a course of training filled up the cup of Pharmaceutical education, which, in ninety-nine cases in every hundred, was to fit and qualify a youth to become an assistant, and eventually the proprietor of a similar establishment. And at that period, such as this educational career was, it was in most cases the best that could be had; and, in many instances, better than was bestowed. There were, I am well aware, some exceptions, but which simply testified to the rule; there were even in those days some Pharmaceutists who had a notion, and a very great wish to encourage the idea that something beyond the ordinary labour was most desirable, and who would urge upon their apprentices the necessity and advantages to be derived from studying such works upon Chemistry as their means would enable them to obtain, who would even suggest the propriety of reading some elementary work on Botany, and who would occasionally give them the opportunity of attending a chemical lecture at the Marylebone Institution; fortunate the apprentice who had such a master, and equally so the master having an apprentice alive to the benefit even of this scarce opportunity.

But let me turn now to a somewhat brighter portion of our career. About the same time of which I write a change began gradually, and of recent years more rapidly, to develop itself among the Pharmaceutists or Chemists and Druggists, as they were then generally called; men sprung up, urged on either by their own natural love of art and science, or stimulated by the example of men in a similar capacity on the Continent, who determined not simply to rise on their own parts, but by the force of example and circumstances, to constrain others to emerge from the ranks of educational destitution, and set to work to gain for themselves a more honourable position amidst the Pharmaceutists of the world—a few, aided, it is true, by some, and encouraged by others, established the Pharmaceutical Society as the basis and groundwork of our educational improvement, and after years of unremitting labour and exertion, succeeded in elevating the position of the Pharmaceutical Chemists as an educated body. The Chemist, even in his original condition, was always regarded by the public as a tradesman of a higher order of education, and is now admitted, and with justice, as such not only by the general public, but equally so by members of all the learned professions. There exists in the Pharmaceutical Chemists as a body a much greater proficiency in every branch of knowledge connected with their vocation. True it is that private laboratories are still far, very far from numerous, and in numberless establishments every article really requiring any art in its manufacture, is purchased from the wholesale houses; but, with very few exceptions, the works either of Brande, Christison, Fownes, Lindley, Smith, Mohr and Redwood, Pereira, Royle, or Parnell, may now be found as regular household gods in most pharmaceutical establishments, and where this is not the case, residents in London have no excuse for not reading from lack of books—honest instructors which teach, without favour or flattery—the Library of the Pharmaceutical Society will yield abundant food for those who desire to read, as Members may have any book, in accordance with regulations, either for their own use or that of their assistants and apprentices. The Museum affords such a collection of specimens as I believe can be seen nowhere else, and the Lectures on Pharmacy, Chemistry, Materia Medica, and Botany, with practical instruction in the Laboratory relative to Pharmaceutical Chemistry, would fully satisfy the desire of those who have the will, the opportunity, and the means of availing themselves of them. Up to the present time all that has been effected partakes entirely of the voluntary

character, and gratifying as it may be to see how much has been accomplished, yet it cannot be denied that to make it truly effectual and general, something more than the love of knowledge and the ordinary requirements of business is necessary to secure a properly qualified system of pharmaceutical education.

Having thus far, without I hope being too minute, traced our career to its present state of improvement, I would, without any undue confidence in myself, suggest an approach to that standard of education, towards which our changing condition would seem to lead.

As a starting-point, it should, I think, be steadily borne in mind, not only by those who have already embraced the occupation of a Pharmaceutical Chemist, but also by those who may hereafter be induced to do so, that whatever love of it as a science may follow, it is generally chosen by a parent as a means of providing for a child, and placing him in a position, when a man, of obtaining an honourable, fair, and reasonable subsistence. Every youth entering upon the business should remember, and indeed it ought in common justice to be impressed upon him, that however irksome or unpleasant the rudimental and elementary portion of the instruction may be; however *infra dig.* the use of a duster or disagreeable stained fingers may seem, these things cannot be avoided, and are absolutely among the essentials in order to give him an insight into his business, and make him a good working tradesman. For unless a man has worked personally, he neither knows when a thing is well done, nor can he tell how it should be done; and, moreover, however consonant with the feelings it may be to become and be thought a man of scientific attainments, and however desirable a thing it may be to bring them to bear upon the ordinary occupation, yet whilst the higher branches are desired and cultivated, the inferior ones must not be slighted, for the proportion of those who obtain a maintenance by the scientific portion of the vocation is very small compared with those who live by the simple trading. The group of Chemists, either as manufacturers, professors or teachers, and analysts, combined with phytologists and botanists, living by their knowledge, must, I think, be very limited, compared with the number who do so by the practice of Pharmacy as Chemists and Druggists. With respect to the number of hours daily to be devoted to business, each locality and the nature of its wants must and will determine, and the supposition of one establishment doing the business of three or four, with a view of relieving each other, becomes a visionary delusion to any one practically acquainted with the nature and details of a dispensing establishment. So long as it applied simply to a few stragglers it would be sufficiently easy, but prescriptions dispensed for a regular patron of a particular house could hardly be repeated by another, months after the original prescription was written and destroyed, without the second applying to the first for a copy of the prescription. Such a scheme must at once be discovered to be impracticable, even if it be admitted that the patient would be a consenting party, which in itself is not probable. To pass now more immediately to the amount of education necessary to make a fairly qualified Pharmaceutist, who shall be equal to the demands of the general public and the requirements of the professional.

A youth of fifteen, or between fourteen and fifteen years of age, having been educated at an average good school will, in all probability, have a very fair knowledge of arithmetic, orthography, and caligraphy, he will probably have some acquaintance with geography and geometry; having these, the addition of Latin becomes indispensable for a Pharmaceutical student, and should be made a *sine quâ non* by every one taking an apprentice; the value of Greek, in tracing the derivation of names and terms would, in time, be discovered; French and German would be decided acquisitions, but these, like Greek, are not essential—indeed, an education too highly charged is not always to be desired, for the brightest scholars are not unfrequently most deficient in more ordinary acquirements. It being ascertained that a youth has been thus far instructed and qualified at school, he may now be introduced to the elementary routine of the

shop, and if there be a laboratory attached, so much the better; he should make himself fully acquainted with the rudiments, whatever they may be—he should especially learn to distinguish every drug and chemical by its own distinguishing characters, without the name being attached—he should obtain as much information, and commit it to memory, as possible, respecting their specific properties and action upon the human race—he should study the composition of every preparation in the Pharmacopœia, preparing them, where possible, independent of this—writing out every preparation as opportunity occurs is an excellent plan of transmitting them to, and retaining them in the memory. The ordinary processes of weighing, infusing, filtering, tincture preparing and percolation, with the reading, and eventually the dispensing of prescriptions, will all follow step by step. Nothing, I believe, short of three years' probation will bring even an intelligent youth to anything like a perfect acquaintance with all that is to be learnt in a shop, because each and every day may bring something before him which as yet he has never heard of; he therefore stands in need of much circumspection, not hastily forming an opinion or arriving at a conclusion upon a point where a doubt may exist. In conjunction with this, he should, at the same time, have an eye to becoming an expert and agreeable man of business, bearing in mind amidst all else that an obliging, easy, yet modest demeanour towards those who may deal with him, will often do more to secure their confidence than an over-display of learning, but which, nevertheless, may with advantage be introduced at the proper stage. My apprentice has now arrived at an age and station of his journey when he should be able, without altogether leaving the shop, to devote a portion of the next two years in attending the lectures, if in London, at the house of the Pharmaceutical Society, upon Practical Pharmacy, Chemistry and Toxicology, Materia Medica and Botany. Some have questioned the necessity and practicability of studying Botany. There are, I admit, many difficulties, but they are in some measure overcome by the opportunity of attending in the Botanical Gardens, Regent's Park. These lectures, with practical instruction in the laboratory, with the assistance of reading, will fill up many vacant corners; and now, this course completed, having passed his examination, he should take for some time a situation as assistant, for no amount of lecturing or reading can bestow that peculiar information which is to be attained only by practical and lengthened experience, for to be a competent Pharmaceutical Chemist it is quite necessary that he should be able to answer the almost endless inquiries of a very inquisitive public. He should know, besides the direct action, the dose of every known drug and preparation, and he should be versed in the antidotes for all poisonous substances; for though he may never be called upon to administer one, the inquiry may be made, "What shall I do?" and "What shall I give?" so-and-so has swallowed laudanum, corrosive sublimate, oxalic acid, or a legion of such impish articles. An exacting public supposes that he is quite competent to name the remedy for every complaint, to discover the disorder for which such-and-such a prescription is written, and if it is really likely to be of service. In fact, as far as the medicine is concerned, he must be a perfect oracle, and the prescriber generally gives him the credit of being acquainted with every novelty, its dose, and the best mode of prescribing it. In order to bring the Pharmaceutical Student to this condition of almost perfection equal to a profession in respect to his acquirements, and at the same time amalgamating some of the most ordinary and trivial duties of a trade, nothing short of the course I have described will, I believe, suffice, but to give apprentices the opportunity and advantage of attending the lectures during the term of their apprenticeship, or should the term be curtailed, masters will require larger premiums as an equivalent for services. That the voluntary system will ever bring us one and all to such a desirable state of educational qualification is almost more than I can, however sanguine my hopes, calculate upon being realized. A compulsory educational Act appears to me to be the only available and effectual course to be adopted,

and such a Bill in the hands of the Government, in place of an impossible Poison Bill, would really be a boon to society, and would do much more towards diminishing the chances of accidental errors through ignorance. To this plan there would be, I am well aware, much opposition, and one of the arguments used against it is this—there must be small shops in small localities and poor neighbourhoods, and it would never answer any one's purpose to stand the expense of your system of education, and afterwards become the proprietor of such a shop. To meet this I can only urge that there are and must be small apothecaries for poor neighbourhoods; there are surgeons and even physicians who are ready to meet the views and requirements of poor and populous districts, and yet their course of education is a very costly one.

On quitting this subject, and I have nearly reached the goal, and it is a subject which has often, from time to time, engaged my thoughts, I would once more urge the importance of remembering that, whilst we educate, we must be careful not to place the man above his business, which is, and must necessarily be, his real remunerative calling: and it appears to me imperative upon every one, whether he be a Member of the Pharmaceutical Society or not, taking an apprentice, to point out to his friends the fact of the demand for an increasing educational qualification, and the probability of further expenditure; and, at the same time, should in justice advise him to enter himself on the books of the Pharmaceutical Society, for assuredly that Society will continue to increase and extend its influence; and whether education be voluntarily or compulsorily directed, it will ever make its way, and compel those who desire or hope to obtain any pre-eminence, to bow to its influence and become its followers.

18, *Conduit Street*, 12*th December*, 1859.

DESCRIPTION OF A CHEAP AND DELICATE BALANCE.

BY MR. EDWARD THOMPSON, OTTLEY.

The chemical student is often an example of "the pursuit of knowledge under difficulties." The Druggist's apprentice has many obstacles to contend with in his attempts to acquire a knowledge of experimental chemistry, arising from want of time, books, instruction, or apparatus. In many cases his progress is stopped for want of an accurate balance. The shop scales in daily use are not sufficiently delicate, or they do not carry a sufficient weight, though they may answer perfectly well for Pharmaceutical purposes; while a balance by Oertling, or other first-rate maker, costs more than the student's limited resources will allow him to pay. If, therefore, the apprentice can be shown how to make a balance for himself, accurate enough for most chemical purposes, I think a benefit will be conferred upon many struggling and deserving individuals. My present object is to explain how this may be done.

I must premise that the idea of this balance, and some of its details, were derived from a well-written paper by Mr. J. B. Cooke, which I found partially copied from the *Mechanics' Magazine* into the *Photographic News* of August 19th, 1859. It is not necessary to detail the differences between Mr. Cooke's balance and my own: it will be sufficient to say that I have retained the principle of his method of producing sensibility, while I have obtained a degree of portability and facility of construction to which Mr. Cooke will probably not lay claim.

In this instrument, the beam consists of a piece of mahogany or other wood, say eighteen inches long, one inch broad, and less than a quarter of an inch thick. A piece of thermometer tube, two and a half or three inches long, is inserted through the middle of this beam, so as to stand as nearly as possible perpendicular to its sides, and to project from them at equal distances. This tube is securely fixed in its position by tying it down to the underside of the beam by means of waxed string, afterwards covered with sealing-wax. Thus are formed the beam and its fulcrum, which require to be raised twelve inches or more

on some suitable support. This may be formed of a box opening in front, which may contain the weights when not in use; or it may consist of an ornamental framework of wood. In either case, the top should be nearly as long as the beam, and should project beyond the lower part six inches at one end, so as to allow room for the scale pan, which, as will presently be seen, is connected with one end of the beam only.

The fulcrum rests on two similar pieces of thermometer tube fixed on the framework on each side of the middle of the beam, and parallel with it, and at such a distance from each other that the beam may freely move between them without contact. These glass supports should be raised upon pieces of wood, so as to allow the bottom of the beam to stand about three-eighths of an inch above the top of the frame.

A piece of sheet lead, heavier than the greatest weight which it is intended that the balance shall carry, in addition to the weight of the scale pan, is now to be screwed upon the upper edge of one end of the beam, so as to hang over on each side. This piece of lead is to form the permanent counterpoise to the weights and substance to be weighed, which are both to be suspended from the other end of the beam. Mr. Cooke suggests that three tiers of scale pans should hang by the same strings, the lowest and largest to hold the matter to be weighed, the middle one for the largest weights, and the upper one for weights below ten grains. The strings supporting these pans are united at the top, and connected by means of a metallic hook with a piece of silk cord having a loop at one end, and attached by the other to the end of the beam, which should be brought to a point or edge, so that the string may hang freely from it.

An iron or brass screw is now to be fixed in the beam, immediately over the fulcrum, and projecting above the beam about half an inch, upon which a circular nut weighing 200 grains or more moves from the top to the bottom. A slip of paper may be pasted on the side of that half of the beam which is next to the scale pans, upon which the space may be divided into ten equal parts, with sub-divisions. In order to prevent the beam from having too much play, two bent brass wires or glass tubes are to be fixed upon the upper part of the frame, at equal heights and at right angles with the ends of the beam, allowing the latter to move up and down not more than 1-20th of an inch. The less movement the beam has, so that it be appreciable, the more speedily are its indications noted. That the slight movements of the beam may be more easily observed, a bit of glass tube may be cemented in a line with and just below the scale end of the beam, but so low as not to touch it when down. When a light is placed behind the balance, the beam in its descent cuts off a reflexion from the top of this tube.

The balance is now made, but in the state in which it has been described it is not a delicate instrument, nor fit for use at all. To become so, it requires to be adjusted. In an ordinary balance, other things being equal, the sensibility depends upon having the fulcrum placed as little as possible *above* the centre of gravity. It must not be *below* it, or the beam will be overset with the slightest impulse, and will remain down at either end indifferently. The fulcrum must not be exactly *in* the centre of gravity, or the beam will cease to vibrate; and it must not be too much *above* it, or the beam will become somewhat like a pendulum, and lose its sensibility. Now the delicacy of an ordinary balance depends upon three things: 1st, That little friction occur between the movable parts; 2nd, that the beam and pans be light; and 3rd, that the fulcrum be properly placed with regard to the centre of gravity. These requirements are complied with in the balance described: there is little friction between the parts forming the fulcrum and its supports; the beam is made of light material; and the centre of gravity is adjusted in the following manner:—So long as the sheet of lead placed at the end of the beam remains flat, the centre of gravity is above the fulcrum. This will be shown, without knowing exactly where the centre of gravity is, by the oversetting of the beam at either end, when nearly balanced. To bring the centre of gravity of the whole beam below the fulcrum, the piece

of lead is to be bent down at each side, until the beam remains down at one end, and cannot be made to do so at the other. This, however, may be called the rough adjustment, as it is not likely that great accuracy can be attained by bending down a piece of lead. The nut and screw over the fulcrum form the fine adjustment; and by moving the nut up and down upon the screw, the centre of gravity may be raised or lowered at pleasure, and with the utmost exactness. Supposing that a platinum wire weighing 1-10th of a grain be used as a rider, to be placed on different parts of the divided half of the beam, then the adjustment should be so made that the beam descends and ascends by the removal of the rider from one part to another. The smaller the difference between one position of the rider and another, so long as the beam repeatedly falls in one position and rises in the other, the greater the sensibility of the balance. Mr. Cooke says that he made a balance which weighed one pound, and turned when loaded with 1-100th of a grain; and my method of construction must necessarily result in a balance *at least* as sensitive as his. But without calling in question Mr. Cooke's assertion, my experience, with his balance and my own, does not justify me in asserting that such extreme sensitiveness is attainable with beams resting on glass tubes, and without glass-cases to prevent the disturbing influence of currents of air.

Weighing by substitution, as it is called, is the method adopted with this balance. It is described by Fresenius (*Quant. Anal.*, p. 22) as yielding "not only relatively, but also absolutely, accurate results, no matter whether the arms" of an ordinary balance "be of exactly equal lengths or not, or whether the scales be of equal weight or not." When a substance has to be weighed in this balance, it is placed in the lowest scale, and weights are added in the upper ones till the beam is brought into a state of equilibrium. Then the substance is taken out of the scale, and weights introduced till the beam is again in equilibrium, when the number of grains substituted indicates the weight of the substance. The use of the rider on the divided beam is obvious, and enables us to dispense with weights smaller than itself altogether.

In planning this balance, cheapness and facility of construction have been constantly kept in view. There is nothing in the whole instrument but what an apprentice can make with his own hands, except, perhaps, the nut and screw of the fine adjustment, which he can easily procure. And when thus made, and taking the lowest estimate of its sensibility, the balance will serve for taking specific gravities, for alkalimetry and chlorimetry, for ascertaining the strength and purity of pharmaceutical preparations, and for most technical purposes.

Should a difficulty present itself to the student arising from his not possessing weights corresponding in accuracy with his newly constructed balance, it may be overcome in the following manner. Let him in some way or other procure a single accurate weight—it matters not to what amount—and he may from this construct a set for himself from pieces of brass, or brass or platinum wire, &c. "Regular weights," says Faraday, "of considerable accuracy are easily obtained, by cutting off equal or given lengths of a copper wire, the wire being of such a thickness, that at least half an inch in length may be allowed for the smallest weight; its uniform thickness should be ascertained by trying the first and the last weight cut off against each other" (*Chem. Manip.*, 2nd Ed., p. 66). Even if an exact weight cannot be procured, the same writer suggests that substitutes for weights may be made, by means of a balance, by adjusting pieces of metal to have equal, double, triple, or any other proportion of weight to a standard piece, and, being used as weights at the time, without any others, will give proportional results; or, if results comparable with other weights are required, their value may be estimated by actual comparison at a future convenient opportunity. The latter plan, however, should not be adopted, unless absolutely necessary. The young Chemist would perhaps act wisely in at once adopting the French system of weights, as it is universally used on the Continent, and is becoming more and more employed in this country.

THE SO-CALLED GRANULAR CITRATE OF MAGNESIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In August last I examined what was represented to be a fine sample of the granular citrate of magnesia. I found it to consist of tartaric acid, carbonic acid, and soda, in such proportions that when the compound was dissolved in water, and the carbonic acid expelled, it formed nearly a neutral solution. There was neither magnesia nor sulphuric acid present in it. This compound had evidently been prepared from bicarbonate of soda and tartaric acid, in the manner indicated by Mr. Draper in the last number of the *Pharmaceutical Journal*. In fact, I prepared some at the time by the same process, which very closely resembled the original.

As there was an attempt made at the meeting, when Mr. Draper's paper was discussed, to make it appear that his analysis does not substantially and generally represent the composition of these granular citrates of magnesia, I think it a matter of justice to Mr. Draper to publish my own experience on this question, believing, as I do, that all these granular citrates of magnesia are made as above stated, with the addition of, in some cases, of an unimportant quantity of sulphate of magnesia. I am, Sir, your obedient Servant,

2, Brook Street, Dec. 16, 1859. Wm. Bastick.

DONOVAN'S SOLUTION.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I have received a communication from a Member of the Society in reference to my paper on Donovan's solution, in the October number of the Journal, requesting that I would remove any doubt which might exist as to the nature of the compound of iodine and mercury, designated as *iodide* of mercury (HgI), which is there directed to be employed.

As this was the name given by the London Pharmacopœia to the *green* iodide, my correspondent justly fears that I might seem to have indicated this latter salt. I wish, therefore, to explain that such was not my intention, but that I adopted, as he suggests, that nomenclature of the mercurial compounds, which gives the equivalent of the metal as 100, regards the red iodide as a proto, and the green iodide as a subsalt.

The possibility of such an error arising from two different theories shows the great necessity of naming these salts from some unmistakable characteristic, until the question shall have been set at rest; and the Dublin College very properly names them from their respective colours, calling the periodide of the P.L. of 1836 *Hydrargyri Iodidum Rubrum*, and the subiodide *Hydrargyri Iodidum Viride*.

Owing to my absence from home, this explanation, which would otherwise have been sent in time for the last number of the Journal, has been unavoidably delayed until the present.

I am, Sir, yours obediently,

Dublin, December 19*th*, 1859. Harry N. Draper.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On some Failures of Marsh's Process for the Detection of Arsenic.—At the last meeting of the British Association, Dr. Odling read a paper, which has been since published in *Guy's Hospital Reports*, showing that the presence of certain organic and saline substances prevents the formation of arseniuretted hydrogen, and consequently destroys the action of Marsh's test. The author had occasion to examine a soil which contained 0.07 of arsenious acid. Ready indication of the presence of the arsenic was obtained by Reinsch's process, but, most unexpectedly,

when the dilute hydrochloric or sulphuric decoction was tested in Marsh's apparatus, no result could be obtained. Thus, 100 grains of the dried soil, boiled with half an ounce of muriatic acid and three ounces of water, yielded a solution in which no arsenic could be detected by Marsh's test, yet the liquid poured out of the apparatus and boiled with copper foil, gave a metallic deposit, from which crystals of arsenious acid were obtained. Another acid decoction prepared in the same manner, was distilled to dryness, and the distillate transferred to Marsh's apparatus, when characteristic stains were obtained with the greatest facility. Also, when the 100 grains of soil were heated with strong oil of vitriol, so as to thoroughly char the organic matter, then diluted with water, and the filtered solution tested by Marsh's process, a satisfactory reaction was obtained. One-fifteenth of a grain of arsenious acid was then added to ordinary non-arsenical soil, and precisely the same results obtained—that is to say, the simple dilute acid decoction gave no evidence with Marsh's test.

Two different specimens of grass that had been grown upon arsenical soil, and also some hay to which one-fifth of a grain of arsenious acid had been added, were examined; the acid decoctions tested by Reinsch's process readily furnished arsenical deposits, but afforded no evidence in Marsh's apparatus. Two quantities of human stomach, each weighing two ounces, were boiled for an hour, one with dilute muriatic, the other with dilute sulphuric acid, and the decoctions filtered off and mixed with from a fourth to a third of their bulk of rectified spirit. To about three ounces of each decoction 0.01 of arsenious acid was added, and the liquids then tested in Marsh's apparatus, but no arsenical stains could be procured; whereas ordinarily the one-hundredth of a grain of arsenious acid in three ounces of dilute muriatic or sulphuric acid, affords characteristic arsenical stains with the greatest facility.

From these results it appears that Marsh's process cannot be relied upon to detect minute quantities of arsenic in the presence of organic matter, that is, under conditions in which it can be most satisfactorily detected by Reinsch's process. The plan recommended by Dr. Odling for extracting the arsenic from an animal tissue, in a state suitable for testing, is as follows:—About a quarter of a pound of the tissue, cut or broken up, is placed in a beaker glass with an ounce and a half of water, and half an ounce of muriatic acid. The beaker with its contents, covered by a glass plate, is then stood upon a sand bath, and maintained at an almost boiling temperature for half an hour. There is no fear of any arsenic being lost during this digestion, for even the first half of the distillate from such a liquid does not carry off a trace thereof, unless, indeed, a very large proportion be present. The decoction when cold is filtered, and a clear liquid obtained, holding dissolved all the arsenic originally present, even when a great portion of it existed in the state of tersulphide, from the action of sulphuretted products of decomposition. This solution is then in a suitable condition for being tested by Reinsch's process, but to fit it for Marsh's apparatus it is distilled to dryness, or almost to dryness. There is no frothing or any other difficulty until the liquid has nearly all passed over, when it is necessary to be careful. To the residue another half-ounce of strong muriatic acid is added, and the distillation continued. On first applying heat after this addition, there is usually considerable frothing, lasting, however, for a few minutes only, after which the distillation can be carried to dryness without any difficulty. In this way a colourless acid liquid, well fitted for testing in Marsh's apparatus, is obtained, and a small *caput mortuum* entirely free from arsenic. This residue may be dissolved or oxidized by the usual methods, and examined for other metals. The distillate, instead of being tested in Marsh's apparatus, may be treated with sulphuretted hydrogen gas, when the yellow sulphide of arsenic, in a well characterized condition, is precipitated and may be collected and weighed. The arsenic present in the soil before referred to was estimated by this process, the precipitated sulphide being dissolved in ammonia, the solution evaporated to dryness, and the residue weighed. The residue remaining in the retort did not contain a trace of arsenic.

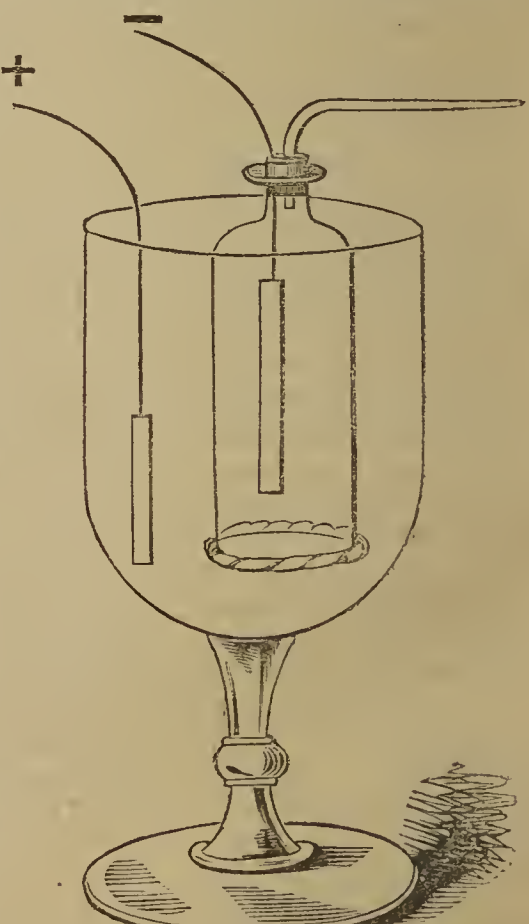
This process also serves for the detection of arsenic in the presence of certain metallic compounds which interfere with the action of Marsh's process, such as the salts of copper and mercury, in the presence of which no arseniuretted hydrogen is formed. The author states that the presence of bismuth does not at all detract from the delicacy of Marsh's test.

When oxidizing salts, such as chlorate or nitrate of potash, are present, which impede the action of this test, the author recommends their reduction by means of bisulphite of soda, the excess of sulphurous acid being afterwards driven off by heat.

On the Detection of Metallic Poisons by means of Electrolysis.—The attention of chemists has been frequently directed to electrical action as a means of separating the poisonous metals from organic mixtures, it being obvious that such a means would present very great advantages over the processes at present adopted by limiting the liability to the introduction of impure materials and enabling the operator to prove the presence or absence of a large class of poisons without destroying or losing any of his material. The experiments which have been made, however, have been too crude and limited in their nature to warrant any reliance being placed upon them as general methods of analysis.

At the last meeting of the Chemical Society, Professor Bloxam, of King's College, gave the results of a very successful investigation of this subject, and showed that, by proper refinement in the method of operating, the process of electrolysis may become a certain and delicate means of detecting one or all of the metallic poisons, at least but with few exceptions. In an examination for arsenic by this method, the metal is obtained in the form of arseniuretted hydrogen ; the process is therefore very similar to that of Marsh—over which, indeed, it does not present any advantage in point of delicacy. Marsh's process, however, although it is capable of doing all that can be done by electrolysis with even greater delicacy, is open to several well known objections, which have stood in the way of its practical adoption by toxicologists. The process of electrolysis does not involve the use of zinc, which is so difficult to obtain pure. It forms a general method for the detection of several metallic poisons at once, and the material tested is not destroyed or inconveniently contaminated, but may be used for another operation. When the arsenic, on the other hand, is present in the state of arsenic acid, it cannot, according to Professor Bloxam's experiments, be detected with certainty by electrolysis. It is consequently necessary to reduce the arsenic acid by means of sulphurous acid. This is an objection which does not apply to Marsh's process. In his earlier experiments, Mr. Bloxam made use of a U tube, containing dilute sulphuric acid ; the substance to be tested was introduced into one of the limbs, and a cork with a bent tube fitted to its mouth; two platinum plates leading from the poles of a battery containing five cells of Groves were introduced into the two limbs, and the liberated hydrogen passed through the bent tube, which was heated by a lamp, when the arsenic, if present, was deposited.

The form of apparatus ultimately adopted as being the most convenient is represented in the accompanying figure. It consists of a two or three ounce bottle, the bottom of which has been cut off and replaced by a piece of vegetable parchment bound on with platinum wire. To the mouth of the bottle is fitted a cork with a bent tube and a piece of platinum wire, which passes through the cork and turns up beneath in the form of a hook. A slip of platinum then hooks on the end of the wire, and passes nearly to the bottom of the bottle ; it forms the negative pole of the arrangement. The bottle stands in an ordinary test glass, and the positive pole, also of platinum, stands in the glass. Dilute sulphuric acid is put into the bottle and also the glass, so as to stand to the same height in both vessels. The substance to be tested is introduced into the bottle, the cork adjusted, and the wires connected with five cells of Groves's battery; a heat of a spirit lamp is applied to the bent tube, and in the course of a quarter of an hour a distinct mirror is obtained if arsenic is present. Standard solutions, containing respectively a tenth, a hundredth, and a thousandth of a grain of arsenious acid, were prepared and examined by this process, and in every case a successful result was obtained. These solutions were then mixed with organic substances, such as the ordinary arti-



cles of food—meat, eggs, milk, &c.—and the resulting matter examined. It was got into solution by means of chlorate of potash and hydrochloric acid, and the resulting fluid evaporated down, by means of a water bath, to a thick syrupy liquid. The arsenic was thus obtained in the state of arsenic acid, which does not give a certain result by the electrolytic process. Some sulphurous acid was therefore added, and the mixture introduced into the bottle, after expelling the excess of sulphurous acid by evaporation ; a drachm of alcohol was then poured over the surface, and the process put into operation. The author prefers to add this drachm of alcohol in every case, inasmuch as it not only allays the frothing, but also affords an additional indication of the presence of arsenic ; for, when these two substances are present—the alcohol and arsenic—the gas which escapes at the open end of the bent tube possesses a very peculiar odour resembling alkarsin. If a little sulphurous acid be present, it also furnishes an additional character indicative of arsenic —namely, a slight yellow deposit, consisting of sulphide of arsenic, close to the borders of the metallic mirror. In all these experiments, of which a great number were made, the thousandth of a grain of arsenious acid was readily detected.

The other metals which may be detected by this process are mercury, antimony, copper, and bismuth; lead is precluded by the sulphuric acid which is present. These are all precipitated in the metallic form upon the slip of platinum, and even in the case of antimony a mere trace of antimoniuretted hydrogen is formed, the metal being all deposited upon the negative pole. The mode of proceeding in these cases is precisely similar to that adopted for arsenic ; when the operation is concluded the slip of platinum is detached, washed, and the deposit dissolved off and tested in the usual manner. Thus, where an organic mixture has to be examined for arsenic, mercury, antimony, copper, and bismuth, it is prepared in the manner just described for arsenic, and the resulting liquid introduced into the bottle, the drachm of alcohol poured over the surface of the contents, the cork adjusted, and the battery connected. The heat of a spirit lamp is applied to the bent tube, and the operation continued for about a quarter of an hour or twenty minutes, when, if arsenic is present, a metallic deposit, accompanied by some crystals of arsenious acid, will be formed in the tube, and the escaping gas will have the alkarsin-like odour. The piece of platinum in the bottle is next removed, washed, and boiled in yellow sulphide of ammonium. Antimony would be dissolved, and might be obtained as sulphide, by evaporating this solution to dryness. The other metals would still remain on the plate; it is next boiled in nitric acid containing a trace of hydrochloric acid, the solution evaporated to a small bulk, and an excess of ammonia added. Oxide of bismuth would be precipitated, together with whatever traces of platinum had been dissolved. The precipitate may be dissolved in HCl, and tested by pouring into water, &c. The ammoniacal filtrate would contain the copper, indicated by its blue colour, and the mercury. By boiling with HCl, and a slip of copper, the latter would be separated in the metallic form.

It will be seen, therefore, that this process of electrolysis admits of being very readily engrafted into the regular course of analysis, inasmuch as it affords an easy means of examining an organic mixture for all the ordinary metallic poisons, without so far injuring or destroying the material as to preclude the employment of other tests.

GRIFFIN'S PATENT BLAST GAS FURNACE.

[The following description is extracted from the tenth edition of Griffin's *Chemical Recreations*, just published:—]

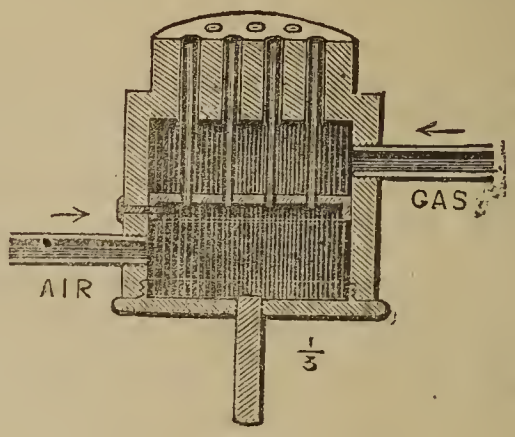
The Patent Blast Gas Furnace

Consists of two parts, namely, of a particular form of Gas-burner, which is supplied with gas at the usual pressure, and with a blast of common air, supplied by bellows or a blowing machine, at about ten times the pressure at which the gas is supplied.

Secondly, of a Furnace, which is built up in a particular manner, round the flame that is produced by the gas-burner, and the crucible that is exposed to ignition. The object of the particular construction of this furnace is to accumulate and concentrate in a focus the heat produced by the gas flame, and to make it expend its entire power upon any object placed in that focus.

This apparatus can be made of various sizes, according to the amount of work which is required from it. I shall describe a few varieties of the furnace, and the results of some experiments made with them, which will show the reader what kind of work it is able to execute.

The Gas-burner.—The gas-burner is a cylindrical iron reservoir, constructed as shown in section in fig. 415, which is drawn on a scale of one-third the full size. It contains two chambers, which are not in communication with one another. Into the upper chamber, gas is allowed to pass by the tube marked GAS. Into the lower chamber, air is forced by the tube marked AIR. The upper part of the burner is an inch thick in the metal. Through this solid roof holes are bored for the escape of the gas. The experiments described hereafter were made with a burner that contained sixteen holes, arranged as shown in fig. 416, which is a surface view of the burner represented by fig. 415. But burners with six holes, and with twenty-six holes, have been made for other purposes. The number of holes depends, of course, upon the heating power required from the burners. The air passes from the lower chamber, through a series of metal tubes, placed in the centre of the gas holes, and continued to the surface of the burner, so that the gas and air do not mix until both have left the gas-burner, and then a current of air is blown through the middle of each jet of gas. The bottom of the gas-burner is made to unscrew, and the division between the two chambers, which carries the air-tubes, is easily removable, for the purpose of being cleaned. The GAS and AIR pipes which I have used are both half an inch in the bore, and are ten inches long; the gas has usually had a pressure of half an inch of water, and the blast of air about ten times that pressure. The quantity of gas used in an hour was about 100 cubic feet. The stopcock which supplied it had a bore of half an inch. The round rod, which is represented at the bottom of the burner, fig. 415, is intended to fit it to the support, shown by *b*, in figs. 430 to 433.



415.

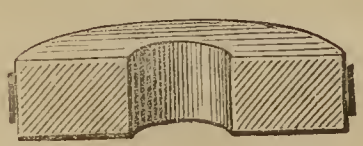
416.

When the gas is lighted and the blast of air is put on, the flame produced by the gas-burner is quite blue, and free from smoke. It is two inches in diameter, and three inches high, and the point of greatest heat is about two inches above the flat face of the gas-burner. Above this steady blue flame there rises a flickering ragged flame, several inches in height, varying with the pressure of the gas. In the blue flame, thin platinum wires fuse readily.

When the gas is burning in this manner, and the apparatus is attached to flexible tubes, the burner may be inverted or held sideways, without disturbing the force or regularity of the flame, so that the flame may be directed into a furnace at the bottom, the top, or the side, as circumstances may require.

The following articles are used in building up the gas furnace for different expreiments. They vary in size according to the volume of the crucible, or the weight of the metal which is to be heated, but I may give a general idea of them by saying that figs. 417 to 429 are drawn of about one-sixth part of the actual size of the articles which they respectively represent. The scales of figs. 430 to 433 are marked upon them.

Fig. 417 represents a section of a circular plate of fire-clay, two inches thick, with a hole in the centre, which exactly fits the upper part of the gas-burner,



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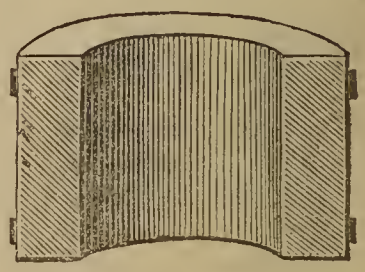


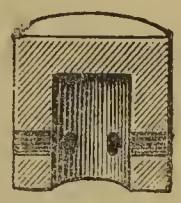
418.

which is made to enter into the hole three-quarters of an inch. In external diameter, this clay plate agrees with each size of furnace.

Fig. 418 represents a section of a cylinder of fire-clay, of which two pieces are

required to constitute the body of each furnace. In the middle of each cylinder, a trial-hole is made, one inch in diameter, to which a fire-clay stopper is adapted.—See fig. 430.

Fig. 419 is a section of a fire-clay cylinder, closed at one end, and pierced near the open end with six holes, of half an inch in diameter. The thickness of the clay is immaterial.



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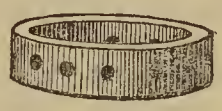


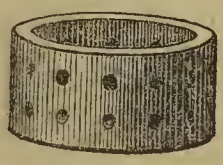
421.

This cylinder is three inches high and three inches in diameter.

Fig. 420 represents a circular plate of fire-clay, two and a half inches or three inches in diameter, and one inch thick. Similar pieces $\frac{1}{2}$ inch thick are useful.

Fig. 421 is a cylinder of plumbago, to be used as a crucible support. It is three inches inside diameter and one inch in height. It is pierced with twelve holes of three-eighths of an inch bore.

Fig. 422 is a similar cylinder of plumbago, two inches high, pierced with twenty-four holes of three-eighths of an inch bore.



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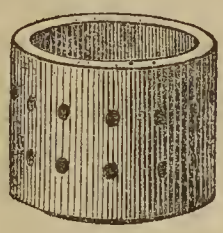


423.

424.

Fig. 423 is of the same nature and material, but is three inches in height. It has twenty-four holes of three-eighths of an inch bore.

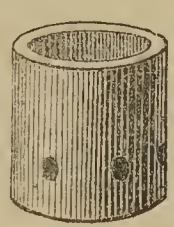
Fig. 424 is a thin plate of plumbago, three inches in diameter, namely, of the same diameter as the above three cylinders. It has a small hole in the middle, and being of a soft material, the hole can be easily cut or filed to suit crucibles of any desired size.

To suit the larger kinds of crucibles and furnaces, cylinders are made resembling fig. 423 in form, but of greater diameter.

As in all cases the heating power of the gas furnace spreads laterally, and does not rise vertically, the most advisable form of the crucibles required for use in it, is *short and broad*, not tall and narrow, and the supporting cylinders must be shaped accordingly. No fire-bars or grates can be used to support crucibles in this gas furnace, because no material, formed into narrow bars, can sufficiently withstand its powers of fusion and combustion.

Fig. 425 is a plumbago cylinder, or crucible-jacket, two and a half inches high, two and a half inches in diameter, and a quarter of an inch thick in the walls. It has six holes of three-eighths of an inch diameter near one end.

Fig. 426 represents a circular cover or dome, flanged at the bottom, and having a knob or handle at the top. It is pierced with twenty-four holes of a quarter of an inch in diameter, arranged in two rows near the bottom. This dome, when of small size, is made of plumbago. When of large size, of fire-clay.



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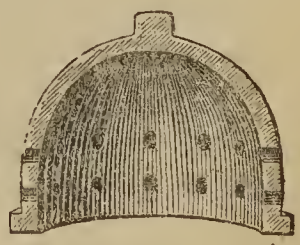

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Figs. 427 and 428 represent plumbago crucibles made with a solid overhanging

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428.

429.

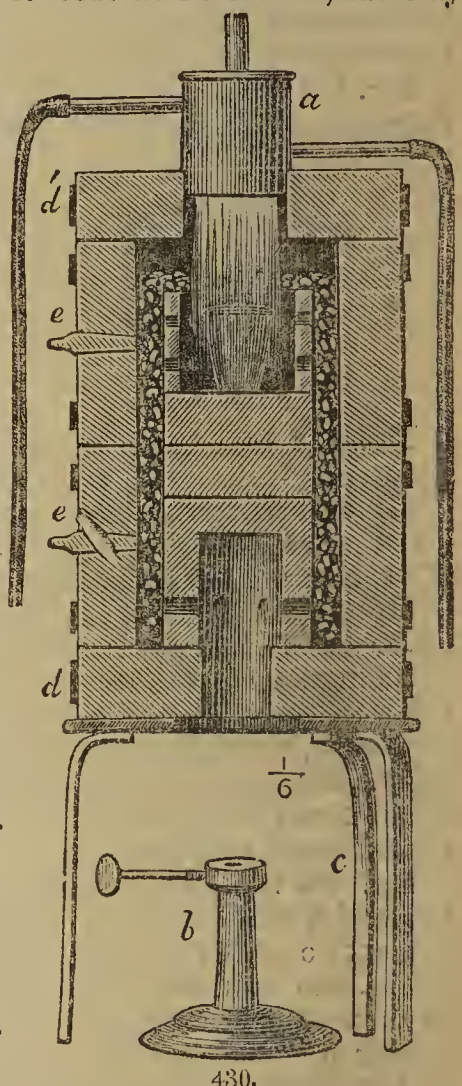
rim, the use of which is to suspend the crucibles over the gas-burner, by means of the cylinders, figs. 421 to 423. When the crucibles are too small to fit the cylinders, the flat plate, fig. 424, is filed to fit the crucible, and is then placed on the cylinder, to whose diameter it is adapted.

Fig. 429 is an ordinary crucible of porcelain or platinum.

Besides these pieces of fire-clay and plumbago, it is necessary to be provided with a strong iron tripod, to sustain the furnace, as represented by e, in figs. 430 to 433 ; an iron pan, in which to place the furnace ; and a quantity of gravel, or rounded flints, not less than half an inch, nor more than one inch, diameter. These pebbles form an essential part of this gas furnace.

Gas Furnace, heated at the Top, exhibited in Section by fig. 430.—*a* is the gas-burner, fig. 415 ; *b* is the support for it, when used below the furnace ; *c* is the iron tripod support for the furnace ; *d*, *d*, are two perforated clay plates, like fig. 417, adapted to the gas-burner *a* ; *e*, *e*, are two clay cylinders, like fig. 418. These pieces, *a*, to *e*, are similar in all the furnaces represented by fig. 430 to 433, and will not require description in each example.

The interior of the furnace, as represented by fig. 430, is built up as follows :— The clay plate, *d*, is put upon the tripod *c*. Over the central hole in *d*, the clay cylinder, fig. 419, is placed, and upon that cylinder two or three of the clay plates represented by fig. 420. Upon these a porcelain or platinum crucible similar to fig. 429, is placed. If it is of platinum, a piece of platinum foil may be put between the crucible and the uppermost clay plate, to protect the crucible from contact with particles of iron, or against fusion with the clay. The crucible is to be covered by the plumbago jacket, fig. 425. The space between this pile in the centre of the furnace and the two cylinders, *e*, *e*, which form the walls of the furnace, is to be filled with flint stones or gravel, washed clean and dried. The stones which answer best are rounded, water-worn pebbles, of half an inch to one inch diameter. These may be piled up to the top edge of the jacket, fig. 425. The number of clay plates, fig. 420, must be such as to bring the top of the crucible, fig. 429, to the distance of two inches, or two and a half inches at the utmost, from the flat face of the gas-burner, *a*. In some cases, merely one of the furnace cylinders, *e*, is necessary, in which case the crucible and its jacket is placed directly upon the cylinder, fig. 419, and when only a moderate heat is required, even the packing with pebbles may be dispensed with. Another means of diminishing the heat is that of increasing the distance between the gas-burner and the crucible.



430.

The apparatus being thus arranged, the gas is to be turned on, and to be lighted, the blowing-machine is to be put into action, and the nozzle of the gas-burner is to be depressed into the central hole of the clay plate *d*, as shown in fig. 430. The whole force of the blue flame then strikes the crucible ; part of it forces its way through the holes in the jacket, fig. 425, and part of it rises and passes over the upper edge of the jacket ; after which it forces its way downwards between the pebbles. The carbonic acid gas and the vapour of water which result from the combustion of the gas, together with the nitrogen of the air, and any uncombined oxygen, accompany it. No space being left open for the escape of these gases at the upper end of the furnace, they go downwards through the interstices among the pebbles, and passing through the holes in the cylinder, fig. 419, and through the central hole in the lower plate *d*, fig. 430, they escape finally into the air. In this progress, the hot gases give up nearly all their heat to the flint stones. Water and gases escape below at a very moderate temperature, water even runs down in the liquid state, while the stones rapidly acquire a white heat, and if the blast and the supply of gas is continued, they retain that white heat for any desired length of time—for hours.

At the end of ten minutes after lighting the gas, the crucible, placed in the de-

scribed circumstances, and exposed to the full action of the heat of the gas, and surrounded by substances which are bad conductors of heat, is raised, with the jacket and pebbles around it, to a white heat. The consequence is, that the full power of the gas jet is then exerted upon the crucible and its contents, and those effects are produced which will be described presently.

If it is desired to inspect the substance subjected to the action of heat in this furnace, the gas-burner is lifted out, and the crucible is examined through the hole in the clay plate. To make it possible to inspect substances at a white heat, the view is taken through a piece of dark cobalt blue glass. If the substances submitted to heat suffer no harm from the action of oxygen, it is better to dispense with a crucible cover, and to direct the jet of flame directly down upon the substance to be heated. The action is then more rapid. When the burner is taken out the substance in the crucible can be stirred if it is considered necessary.

The following experiment will give an idea of the power of a furnace of this description. A common clay crucible, three inches high and three inches diameter at the mouth, was filled with about twenty-four ounces of cast iron. It was mounted like fig. 430, in a furnace of four inches internal diameter, and eight inches deep. The pebbles were filled in to the edge of the crucible. No crucible-cover and no jacket were used. The flame was thrown directly upon the iron. In a short time, the iron melted, the oxygen then converted some of the cast iron into magnetic oxide of iron, which formed a thin, infusible mass, on the surface of the cast iron. At twenty minutes from the lighting of the gas, the furnace was dismounted. The crucible was taken out. A hole was broken by an iron rod in the infusible surface of oxidised iron, and the fused cast iron below it was decanted into a mould, and made a clear casting weighing twenty ounces.

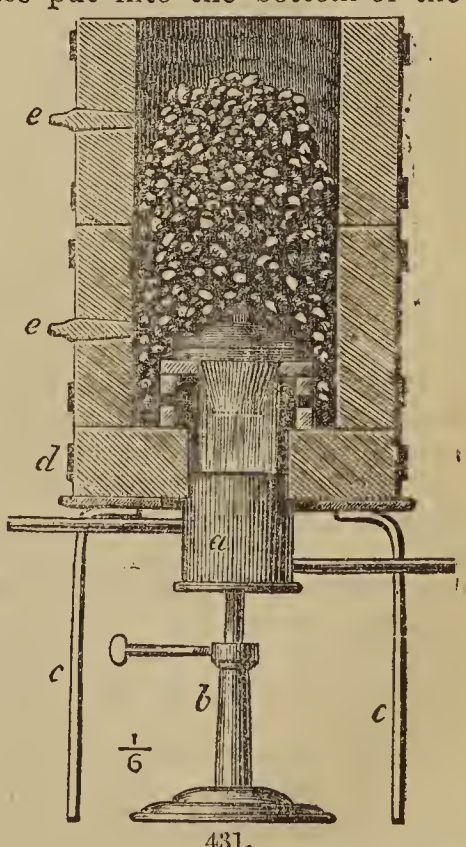
In the same small furnace 32 ounces of copper can be fused in 15 minutes. When the furnace is hot, that quantity of copper or cast iron can be fused in 10 minutes.

In a furnace of the same dimensions, but with a gas-burner having only six, instead of sixteen jets, 16 ounces of copper or of cast iron can be completely fused, in ten minutes if the furnace is cold, and in seven minutes if the furnace is hot.

These experiments show that within twenty minutes a heat is producible in this little furnace which is more than sufficient for the decomposition of silicates by fusion with the carbonates of potash, soda, or barytes.

Gas Furnace heated at the Bottom, exhibited in Section by fig. 431.

In this furnace the parts marked *a*, *b*, *c*, *d*, *e*, *e*, are the same as those similarly marked in fig. 430; but the gas-burner is in this case put into the bottom of the furnace, instead of the top, and the arrangement of the crucible and its support is altered in the manner shown by the figure. Upon the centre of the clay plate *d*, the perforated plumbago cylinder and cover, represented by figs. 421 and 424, are placed; and upon them a plumbago crucible of the form shown by fig. 427. The size of the crucible and the height of the perforated cylinder are to be so adjusted that the bottom of the crucible shall be struck by the hottest part of the gas flame; that is to say, the space left between the face of the gas-burner and the bottom of the crucible must not exceed two and a half inches. The crucible is provided with a closely-fitting cover, and pebbles are then filled in between the crucible jacket and the furnace cylinder *e*, and are covered over the crucible until both the pieces of the furnace *e*, *e*, are filled. The gas is then lighted, the blast of air is set on, the gas-burner is forced up into the hole in the clay plate *d*, and the operation proceeds. In from ten to twenty minutes after the gas is lighted—this difference of time depending upon the size of the furnace and the weight of the metal contained in the crucible—the interior of the lower cylinder *e*, acquires a white heat. The progress of the operation can be watched by occasionally removing the stone peg in the trial hole of the furnace cylinder *e*.



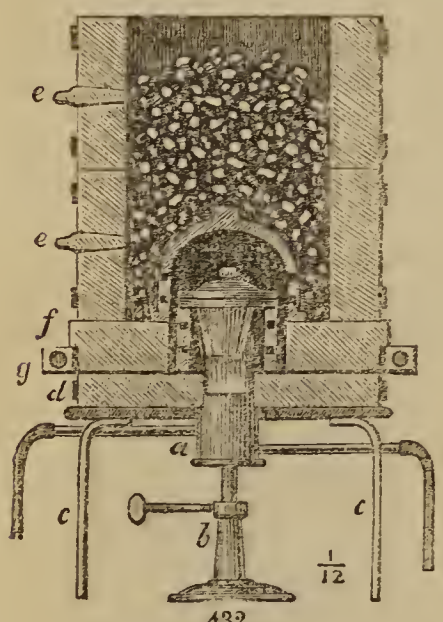
431.

The heat very slowly ascends into the upper cylinder, and it never becomes so great in the upper as in the lower cylinder. The greatest fusing power of the furnace is confined within a vertical space of about six inches, reckoning from the bottom. The power of flint pebbles to abstract heat from the gases which pass through this apparatus is quite remarkable. When about six inches of pebbles lie above the crucible, and the crucible and the pebbles about it have been white-hot for half an hour, the hand can be held over the top of the furnace, within a few inches of the pebbles, without inconvenience. It becomes wetted with the vapour which rises from the furnace, but feels only a moderate degree of heat.

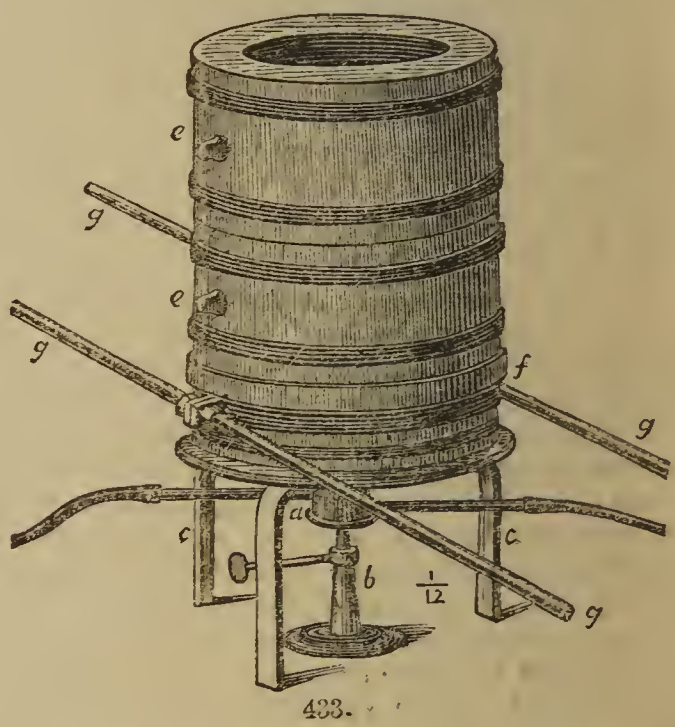
This form of the furnace is attended by the inconvenience that you cannot examine the condition of the matter contained in the crucible, to ascertain when the heat has been continued long enough. In cases where the fusion is performed repeatedly on the same weight of metal, this would be of no importance, because the power of the furnace is so steady and regular, that the time of firing which has been found to answer once will answer the same purpose again.

When it is supposed that the fusion of the metal submitted to trial is completed, the gas is first to be turned off, and then the supply of air stopped. You can either allow the furnace to remain intact till it is cold, or lift off the cylinders *e*, *e*, with tongs, and allow the hot stones to fall into the iron pan placed below the furnace to receive them. A few bricks should be laid between the pan and the table or stool on which it rests, if the latter is made of wood ; because the heat given off by the pebbles is very great. The pebbles being raked away from the crucible, the contents of the latter can be examined.

Gas Furnace heated from below, and provided with a lifting apparatus, to afford access to the crucible ; exhibited in Section and in perspective by figs. 432 and 433.



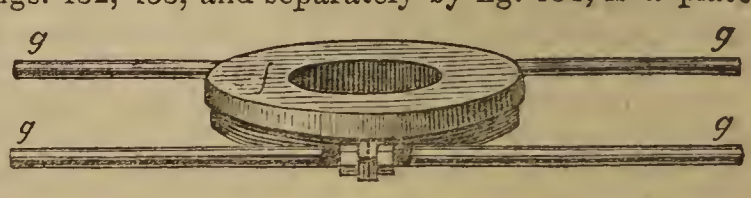
432.



433.

This modification of the furnace is contrived to afford the means of inspecting the contents of the crucible, without serious interruption to the process of ignition. The apparatus is shown in section by fig. 432, and in perspective by fig. 433. Besides the pieces that are similar to those which form the other furnaces, this furnace has two additions, a *lifter* and *dome*.

The *lifter*, represented by *f*, in figs. 432, 433, and separately by fig. 434, is a plate of fire-clay, two inches thick, and having a central hole, *large enough* to go easily over the crucible jackets and crucibles represented by figs. 421 to 424, 427, and 428 ; and *small enough* to permit the plate to carry and lift up the *dome*, fig. 426, when of a sufficient size to cover the crucible. The lifter is bound with a ring of stout iron, and is screwed to two iron rods, *g*, *g*, of from half an inch to three-quarter



434.

inch in thickness, and three to four feet in length, according to the size and weight of the furnace to be lifted.

The packing of this variety of furnace is performed as follows : the clay plate *d*, and the lifter *f*, are placed upon the tripod-stand. The crucible jacket, fig. 423, or similar one, but of larger size, is placed upon the plate *d*. The crucible and its cover is then put into its place, and is covered with the dome, fig. 426, which must rest upon the lifter *f*, and must be of such a width as to clear the crucible easily when lifted. The internal height of the dome should be such as just to clear the top of the crucible cover. Consequently, where crucibles of different sizes are used, domes of different sizes are also necessary. Observe, distinctly, that the crucible and its support are to rest upon the plate *d*, and the dome upon the lifter *f*. The furnace cylinders *e*, *e*, are now to be superposed, and the space between the dome and the cylinders, and that above the dome, are to be filled with small pebbles as already directed. The gas may then be lighted, the blast of air set on, and the operation be allowed to proceed.

When the ignition has been continued as long as is considered necessary, or when you wish to inspect the contents of the crucible, the gas is to be turned off, the blast of air stopped, and two men, holding the bars *g*, *g*, are steadily to lift up the whole upper part of the furnace, namely, the lifter *f*, the two cylinders *e*, *e*, the dome, and the pebbles; leaving the clay plate *d*, with the crucible and its jacket, both at a white heat, standing clear in the middle. The cover of the crucible is then to be lifted, and the contents examined. If the fusion is not completed, the furnace is to be carefully lowered into its former position, the gas is to be turned on, and the blast renewed. This interruption of the process scarcely occupies a minute. I have already mentioned that, for the convenient inspection of the crucible at a white heat, it is necessary to look at it through a piece of dark-blue glass.

The figures of the gas furnaces are drawn to scales, which show the relative proportions of the different parts. The absolute sizes of the furnaces depend upon the amount of work required from them. The fusions described below were mostly made in a furnace of six inches internal diameter, a few in a furnace of four inches internal diameter, and one or two in a furnace of eight inches internal diameter ; all of them with a gas-burner of sixteen holes, and a supply of gas obtained from a half-inch pipe. A large furnace on the plan of figs. 432, 433, and with an internal diameter of twelve inches, will demand a gas-burner of twenty-six holes, and a supply of gas from a pipe of nearly one inch in the bore.

Examples of Fusions effected by the Blast Gas Furnace.—The fusing points of certain metals have been fixed by Daniell at the following temperatures:—

Silver.....	1873° F.	Copper	1996° F.
Gold.....	2016°	Cast iron	2786°

Brass, with 25 per cent. of zinc, at 1750° F.

All these metals melt readily in the gas furnace. Quantities of 3 lb. of copper or cast iron can be completely fused in fifteen minutes in a six-inch furnace. Quantities of 8 or 10 lb. of copper or cast iron can be completely fused into a homogeneous mass in a six-inch or eight-inch furnace within one hour, using a sixteen-hole burner, and a supply of gas from a half-inch pipe.

In a furnace of the same size I have fused 45 ounces of nickel, and in other experiments I have produced masses of wrought-iron weighing 18 ounces, 28 ounces, and 40 ounces. The piece of 18 ounces was perfectly fused. The piece of 40 ounces was not quite fused, the crucible having melted, and stopped the operation. I have also fused cobalt, and reduced it to the metallic state from the peroxide by ignition with charcoal. The time required for the fusion of these refractory metals is from one and a half to two hours.

Scraps of platinum can be fused into a porous mass, but not into a solid homogeneous bead. I have mentioned that thin platinum wires fuse readily in the free flame of the gas-jet produced by the burner fig. 415 ; but when the jet plays upon a quantity of the metal contained in a crucible the relations of power and effect are different.

When the metals to be melted are such as do not undergo oxidation, the method of action represented by fig. 430 is most convenient. In this manner gold can be readily melted, and by removing the gas-burner the melted metal can be stirred. When the action of oxygen is to be avoided, the crucible must have a cover, which in some cases should be securely luted to it.

Choice of Crucibles.—The experiments above referred to were made with coal gas at the ordinary pressure, and with a blast of cold atmospheric air. Greater effects

can be produced by the use of oxygen gas, or of heated atmospheric air. But a difficulty stands in the way of the use of these greater degrees of heat in the want of crucibles capable of enduring their action.

With cold atmospheric air, pure nickel and pure iron dissolve every kind of siliceous crucible, and it is therefore needless to heat the air or to prepare oxygen till a superior kind of crucible is obtainable. At present, these metals can only be melted in plumbago crucibles, which necessarily communicate to them more or less carbon.

Metals which melt at moderate degrees of heat, such as gold and copper, are easily fused either in clay crucibles, or in those of plumbago ; the latter, be it remembered, being a mixture of graphite and clay. Metals in combination with carbon, such as cast iron, also melt readily in clay crucibles, without destroying them. But when such metals as iron, nickel, and cobalt, are freed from carbon, and brought into a state of purity, they acquire an extraordinary attraction for silica at a white heat, so that the metal and the silica readily run down into a very fusible silicate. Even when plumbago crucibles are used, the carbon burns away at some particular point, the metal then attacks the clay, bores a hole through the crucible, and finishes the operation. No kind of clay or porcelain will withstand the action of pure iron or nickel at a white heat. It is therefore impossible to effect any large fusions of these metals when they are free from carbon, or when they are heated in crucibles that are free from carbon.

Fusion of Metals in large quantities, and Ignition of Objects of large size.—As the gas-burner, fig. 415, can be held in any required position, it is possible to apply heat to large objects by using several gas-burners. Thus, a large crucible may be fixed in a square furnace, and gas-burners be applied below and on the four sides of the furnace ; the spaces between the crucible and the walls of the furnace being filled with pebbles, to collect the heat and apply it to all parts of the crucible.

Muffle Furnace for Assaying, Roasting, &c.—A muffle, placed in an assay furnace, and built up with pebbles, can be heated either from above or from below by the blast gas-burner. The flame and products of combustion can be made to sweep through the muffle, whether going upwards or downwards. The *air* pipe and *gas* pipe attached to the gas-burner, fig. 415, must each be provided with a stopcock. When the front door of the muffle is opened to afford the opportunity for examining the cupels, the blast, if continued, would blow out there against the operator ; but that occurrence is prevented by turning the stopcocks. When it is desired to oxidise the substances in the muffle, the furnace is first brought up to a sufficient temperature, and then the gas is turned off, but the blast of air is continued. The air passing through the hot pebbles enters the muffle at a high temperature, and not exhausted of oxygen, because there is no carbonaceous matter present among the pebbles when the gas is turned off. The pure and highly heated air is consequently in a proper condition for oxidising metals that are already raised to a red heat in the muffle. The same apparatus is useful where substances require to be roasted in the presence of air, in order to oxidise and expel some volatile ingredient. We have in this process an effectual means of using hot air to aid the process of cupellation.

Distillation per descensum.—Suppose a stoneware bottle with a long neck to be fitted with a stoneware tube, passing nearly to the bottom of the bottle, and projecting some inches beyond its mouth. Suppose this bottle to be half filled with metallic zinc, and then to be fixed upside down in the furnace, fig. 430, with the tube projecting downwards through the hole in the plate *d*, and nearly dipping into a vessel of water. The furnace being packed with pebbles, and the heat applied at the top, the distillation of zinc *per descensum* then takes place.

Miscellaneous Uses of the Blast Gas Furnace.—1. The preparation of chemical substances by the projection of mixtures into a crucible kept at a red or a white heat. 2. For melting silver, gold, copper, cast iron, brass, bronze, nickel-silver, &c., either for making small castings, or ingots. 3. For experiments on glass ; every description of which it is able to fuse. 4. For experiments on enamels, coloured glasses, and artificial gems. 5. For experiments on metallic alloys. 6. For the fusion of steel. 7. For the use of dentists, in the preparation of mineral artificial teeth. 8. For the assay of ores of silver, copper, lead, tin, iron, and other metals. 9. For all purposes of ignition, combustion, fusion, or dry distillation, at a red heat, or a white heat, where it is desirable to produce those temperatures promptly, certainly, steadily, conveniently, and cheaply.

Exhibition of Coloured Flames.—When the gas-burner, fig. 415, is supplied with gas and air, and is inflamed in the open air, so as to produce a clear blue flame of 3 inches long, and beyond it a flickering, nearly colourless flame of 12 inches long, brilliant colours may be given to this flame by the introduction of concentrated solutions of certain salts. A ball of pumice-stone, 2 inches in diameter, fastened to a stout iron wire, is dipped into the saline solution, and while wet is plunged into the flame, upon which the whole flame becomes coloured. Solutions of the following salts may be used for these experiments :—

1. *Chloride of Strontium* gives a brilliant crimson flame. 2. *Chloride of Calcium*, a reddish-orange flame. 3. *Chloride of Sodium*, brilliant yellow. 4. *Chloride of Copper*, bluish green. If the flame is touched on one side with the copper solution, and on the other with the strontium solution, half the flame is green and half crimson. The colours and reflexions of these flames are necessarily most brilliant in a dark room. A remarkable effect is produced by the yellow soda flame. It is reflected from the human countenance with a ghastly blackness.

Repair of the Gas Furnace.—When the clay cylinders become warped or chipped, so a to allow the gases to escape at the joints laterally, they must be luted for each operation by applying a little wet fire-clay by means of a spatula. When only a moderate heat is required, this luting is unnecessary.

The Patent Blast Gas Furnace is capable of melting so many of the refractory metals, and in quantities that are so well adapted for the usual analytical experiments of chemists and assayers, as almost to supersede the use of fixed wind furnaces and portable blast furnaces, fed by charcoal or coke.

ON THE COMPARATIVE VALUE OF CERTAIN SALTS FOR RENDERING FIBROUS SUBSTANCES NON-INFLAMMABLE.

BY FRED. VERSMANN, F.C.S., AND A. OPPENHEIM, PH.D., A.C.S.

(*A Communication read before the British Association for the Advancement of Science, at Aberdeen, the 15th September*, 1859.)

The difference between the chemical constitution of the animal and the vegetable fibre, the first containing about eighteen per cent. of nitrogen, whereas the latter consists exclusively of carbon, hydrogen, and oxygen, involves one of the greatest practical importance. The animal fibre, although subject to the destructive influence of heat, chars when in contact with a flame, but is not itself inflammable, because the gaseous products of it sdecomposition contain an amount of carbonate of ammonia sufficient to rarefy the inflammable hydro-carbons, so as to prevent them from burning, The vegetable fibre, however, if decomposed by heat, evolves gaseous hydro-carbons, mixed with oxide of carbon and a little carbonic acid only, and communicates ignition by burning with a flame.

Wherever it has been possible to dispense with the vegetable fibre in arts and manufactures, it has been substituted by less dangerous materials—wood being frequently replaced by iron, stone, or brick, and paper by parchment.

But the use of cotton and linen is ever on the increase, and will most likely never give place to more solid substances. So great a number of conflagrations, and so considerable a loss of life orginates yearly from the use of these inflammable substances, that we feel justified in attempting to direct the attention of this honourable Association to the following questions:—

What means may be applied for the rendering of these substances non-inflammable? What is the comparative value of these means? and why have none of the means hitherto recommended been introduced into public use?

Nitrogen being, as it were, the safeguard, protecting the animal fibre against fire, the first idea offering must be to introduce nitrogen into the vegetable fibre, in the shape of a soluble animal substance, such as glue or albumen. But these do not contain more nitrogen than hair or wool, or the animal substances from which glue is made and it is easily to be anticipated that a very considerable quantity would be required to render the vegetable fibre non-inflammable, by which its pliability would be lost. Experiments made by us with that view, demonstrated that neither albumen, nor the most concentrated solution of isinglass, can produce that effect.

In order to learn, however, whether eighteen per cent. of nitrogen were really required to protect a thin vegetable fibre, we applied to a piece of fine muslin a

solution of the organic substance, richer in nitrogen than any other—viz., urea. By introducing not less than 28 parts of urea into 100 parts of muslin, we protected the latter from burning with a flame. 28 parts of urea correspond to 13 parts of nitrogen, or the muslin, when rendered non-inflammable, contained 10.2 per cent. of nitrogen. Although this quantity is smaller than might have been expected, still, for all practical purposes, we must look for an expedient amongst the inorganic salts, on account of their comparative cheapness, and all expedients hitherto proposed pertain to this class of substances.

In collecting the information on the subject, we find that, as early as 1735, a patent "for preventing combustible substances from flaming," was granted to one Obadiah Wild, who applied a mixture of alum, borax, and vitriol, either in solution or by mixing it with the pulp before it was made into paper.

This is most likely the process to which De Hemptine, a Belgian chemist, refers, in an essay which appears to be the first extensive investigation of the subject in question and which was published in the *Annales de l'Industrie*, in 1821. He observes, that "the English use a kind of non-inflammable paper in the manufacture of cartridges for their navy."

The attention of many chemists of that period was apparently directed towards this subject, for De Hemptine mentions three compositions, proposed with the same view in other countries—viz., silicate of potash, by Brognatelli ; sulphate of iron, by Hermbstaedt ; and a substance of unknown composition by Delisle.

De Hemptine mentions a great number of substances proposed by himself and others, for rendering canvas and wood non-inflammable, although he himself denies that they are applicable to wood, without offering, however, any reason. He does not sufficiently sift these different expedients, and we find amongst them a number of salts quite useless for the purpose.

In the same year a paper by Gay-Lussac, on the same subject, appeared in the *Annales de Chimie et de Physique*, tome xviii., succeeded by a paper by Prater, in the *Phil. Transactions*, 1839, on the use of the carbonates of potash and soda ; a recommendation of water-glass by Fuchs at Munich ; a notice on the use of a precipitate of sulphate of lime in the *Mittheilungen des Gewerbe Vereins für Hannover*, 1841 ; a paper by Dr. R. A. Smith, in the *Phil. Magazine*, Ser. 3, vol. xxxiv. ; a number of notices of less import ; and a large number of patents taken out for different mixtures in different years.

Gay-Lussac's dissertation on the subject is the only one which discusses the respective amount of different salts required for rendering a certain fabric non-inflammable.

He took solutions containing twenty-five grammes of anhydrous salt in always 250 cub. centimètres, for two series of experiments, with pieces of linen weighing three grammes each.

In the first series he introduced into the pieces of linen always three cub. cent. of the solution, or ten per cent. by weight of the anhydrous salt. Finding no salt to answer in this proportion, he made a second series of experiments, with double the quantity of salts in solution. He then found that linen may be rendered non-inflammable by taking up twenty per cent. of either of the following salts: viz.—

Chloride of ammonium, sulphate, phosphate, borate of ammonia, aud borax, or by mixtures of any two of these salts. He likewise tried solutions of the tartrates of potash and soda, and of chloride of sodium, but without obtaining a favourable result.

Now, the small number of salts tested by Gay-Lussac, as well as the limit whereby he confines his experiments to two proportions only, prevents him from forming conclusions sufficiently general respecting the action of all salts suitable for the purpose. It likewise appears that he confined his experiments to the laboratory, and he was therefore unable to foresee the difficulties arising in the practical application of some of the salts.

Reserving some remarks on other investigations of later chemists, till we enter more at large upon the salts recommended by them, we proceed to describe the method by which we compared the value of forty different salts soluble in water. The experiments include the salts hitherto proposed ; certain others, the application of which we were the first to try ; others, again, worth investigating on account of their chemical analogies only.

Instead of comparing the quantities of different salts which must be taken up by

a certain fabric, we tried to simplify the investigation by determining how strong a solution of different salts is required for our purpose. We thus found that the differences which various salts exhibit in this particular, are more marked than the differences in the increase of weight of fabrics immersed in various solutions, but we also found that both these differences were constant, provided we took care to remove the excess of liquid by squeezing, but without twisting, the muslin, till no drop of the liquid remained clinging to the fabric.

The muslin we used was free from starch and other stiffening agents; twelve inches square weighed 33.4 grains; the degree of non-inflammability was such that the muslin was destroyed only in that part which was in immediate contact with the flame.

The failure to which this method is liable does not exceed two per cent.; and, although far from being entitled to claim absolute exactitude, it is sufficient for practical purposes, and for the explanation of the action of various salts.

Those salts which proved to be preferable on account of the small amount required, or by reason of their properties, were afterwards tested on a large scale, either in the finishing works of muslin manufacturers, or in laundries. The processes resorted to by finishers and by laundresses differ principally in this: that in the manufacturing process the muslin is finished without the application of heat, whereas in laundries the ironing with hot irons cannot be dispensed with.

We may here premise that this circumstance explains why none of the salts hitherto recommended have found favour with the public, none of them allowing the iron to pass smoothly over the fabric, and some even destroying it under the influence of the heat of the iron.

Before proceeding with our observations, we feel bound to express our acknowledgments for the kind and truly liberal assistance which we received from W. Crum, Esq., of Thornliebank, Glasgow, and from Alexander Cochran, Esq., of the Kirkton Bleaching Works, Glasgow, as well as for the favour which enabled us to make a large number of experiments in Her Majesty's Laundry at Richmond.

(*To be continued.*)

THE CASE OF ACCIDENTAL POISONING AT CANTERBURY.

On Sunday, Nov. 20, a young man, named Thomas Benjamin Cole, of Canterbury, died within twelve hours after swallowing a black draught, purchased at the shop of Mr. John Reeve, chemist and druggist in that city. The suddenness of the death gave rise to rumours, in consequence of which a coroner's inquest was held on the following Tuesday, a *post mortem* examination having been previously made by Mr. A. B. Andrews and Mr. Reid, surgeons. At the inquest, Mr. Andrews expressed an opinion that the deceased died from epilepsy, and a verdict of "Natural death" was accordingly returned. In consequence, however, of what afterwards transpired, the case was made the subject of inquiry before the mayor and magistrates, Mr. Wilkinson, solicitor, appearing for the family of the deceased, and Mr. Callaway for Mr. Reeve; when it appeared in evidence, that Inspector Spratt, of the Canterbury borough police, in consequence of suspicions he entertained, bought at Mr. Reeves's shop a draught and box of pills, the shopman who served him taking the bottle from a drawer in which were others already made up. On the evening of the same day he attended the inquest, returning from which he met Mr. Reeve, who seemed much excited. He said to witness, "You have got a draught; if you will give it me, I will give you a sovereign for it, and will make up one which will look exactly like it." Witness refused to give up the draught, and accompanied Mr. Reeve to his house, where he told witness that the draught he had was not a proper one, and that the one that Mr. Cole had was similar. He was again pressed by Mr. Reeve to give up the draught, a promise having been made that an agreement should be drawn up, to keep witness and his family if he got into trouble. Mr. Reeve told witness that there had been a mistake, the label having come off from damp. The sale and the administering of the draught was proved by Jane Sophia Cole, and Henry Charles Cole, her brother.

Mr. A. B. Andrews stated that on Sunday morning, Nov. 20, he was called to see deceased, whom he found quite insensible and almost black. From the appearances, and what was told him, he believed it to be a case of epilepsy, and treated it

accordingly. There was great obstruction to the breathing, and he examined the eye to see whether the patient was labouring under the effects of opium, but found nothing to induce that opinion. Witness saw the deceased again at four o'clock, when leeches were applied, but the same state of insensibility continued, and at six o'clock he was informed of his death. Witness, with the aid of Mr. Reid, made the *post mortem* examination of the body, and found great congestion of all the larger vessels of the head. The heart was much distended, but the valves were healthy. There was a small quantity of liquid in the stomach, which was examined, but no smell of opium could be detected. The result of the examination, and the symptoms differing from any case of poisoning by opium he had seen, led him to the belief that deceased died from epilepsy. Witness was told by Mr. Reeve that the draught taken by the deceased contained one-third of *liquor opii*, a quantity amply sufficient to cause death, and that the mistake arose from the label of the bottle dropping off from damp.

Mr. Reid, surgeon, corroborated the evidence of Mr. Andrews as to the appearances of the body, but differed from him as to the cause of death.

Mr. Linford, chemist, deposed that he had analysed a twelfth part of the draught brought to him by Inspector Spratt, and found that part to contain two grains of extractive matter—morphia and meconic acid—the constituents of opium.

The Bench said they did not for a moment impute to Mr. Reeve any intentional poisoning, but they had no alternative but to commit him for trial on the charge of manslaughter. Bail was taken ; the defendant in £100, and two sureties in £50 each.

After these proceedings, it was reported that James Coppins, a man eighty-two years of age, had also died a few hours after taking a black draught procured from the same shop, in consequence of which the coroner issued a warrant for the exhumation of the body, and held an inquest, when *Elizabeth Coppins*, widow of the deceased, deposed that she purchased a blue pill and black draught at the shop of Mr. Reeve, which she administered to her husband—the pill at night, and the draught in the morning, about an hour after which he was unable to walk, and became drowsy, in which state he remained for three hours, when he died.

Robert Tassell, surgeon, stated that he made a *post mortem* examination of the body, and observed that the vessels of the brain were much congested. The stomach and small intestines were sent to Mr. J. S. Linford for analysis, and the inquest adjourned to the following day, to receive Mr. Linford's evidence, which was to the effect that the stomach contained one ounce and a half of thick brown fluid, a portion of which he subjected to the usual tests, and found in it meconic acid, a constituent of opium. Morphia, the other constituent of opium, was rarely found in the body after death, because of its speedy absorption. He had subjected one drop of the mixture left in the bottle from which deceased had taken the draught, to a chemical test, and there resulted the appearance which testified the presence of meconic acid. He could state positively that the stomach of the deceased contained opium, but could not say whether the quantity was sufficient to cause death, as he had examined only a portion.

Mr. Tassell, on being re-examined, stated that the immediate cause of death was the serous fluid on the brain, but he could not say with certainty whether this was the result of apoplexy or opium.

The jury, after the coroner had summed up, returned a verdict of "Natural death."

POISONING BY CANTHARIDES.

On Tuesday, November 29th, Thomas Spowage (who had for some time been coachman to Mr. Paget, of Staffynwood Hall) was brought before the Derbyshire bench of magistrates at Chesterfield, upon the charge of wilfully administering cantharides to Mary Dean, the parlour maid, and others of the establishment. It appeared from the evidence that on the 2nd of November, five of the servants were taken ill with a burning pain in the bowels, but they recovered on the following day. On Monday, the 14th, Mr. and Mrs. Paget, as well as the remainder of the servants, were affected in a similar manner. Mr. Funis, the medical attendant, was sent for, who pronounced the symptoms such as would be produced by cantharides, Detective Barnes proved apprehending the prisoner, and the identification of the

prisoner by a druggist at Mansfield as the same person who had purchased an ounce of cantharides at his shop two months previously. After a consultation, the presiding magistrate, Mr. E. G. Maynard, decided that there was no criminal law to meet the case, and the prisoner was therefore discharged.

POISONING BY EXTRACT OF BELLADONNA.

THREE boys, named Joseph Irish, James Kelsey, and James Woollen, the two former ten years each, and the latter twelve years of age, were brought up before Mr. Henry, at the Bow Street Police Court, on Thursday, Nov. 24th, charged with stealing from Covent Garden Market about 12 oz. of a poisonous drug called belladonna, and administering it to divers other boys, whereby their lives were endangered. It appeared from the evidence, that William James Lewington, porter to Messrs. Butler and McCulloch, herbalists, &c., Covent Garden Market, had, on Monday, Nov. 21st, packed a hamper containing two jars of belladonna, each jar being labelled "Belladonna—Poison;" the hamper, which was secured with string, was placed outside the shop, waiting for the carrier. It was found that the string had been cut, and about 12 oz. of the belladonna abstracted. Police Sergeant Felton stated that the three prisoners were the most notorious little thieves in the market, and that when apprehended Kelsey had told him that Irish cut the hamper and took out the stuff, some of which they put into a bottle, stolen from the same place, and filled it up with water. About seventeen or eighteen boys had been suffering from the effects of the poison given them by the prisoners, and some of them were in a dangerous state. The following curious evidence was given by the boy Kelsey:—We thought it was liquorice. It was like jam. We made some "Spanish liquorice water" with it, and sold it to the boys for a pin. I tasted it and did not like it, so I was going to throw it away, when a boy asked me to give him some for a pin. I let him have some, and he drank a good lot. Then he wanted some more for another pin, and I would not let him have it, but he drank a lot more in spite of me. Then another boy took it, and said it was "Spanish," and very good. So I had some more.

All the sufferers having recovered, Mr. Henry sent Kelsey and Woollen to the Reformatory, and Irish, at the entreaty of his mother, was delivered to her charge.

POISONING BY ESSENTIAL OIL OF ALMONDS.

A WOMAN named Edmonson, residing in Chandos Street, Bradford, sent to the shop of Mr. Cookson, a Druggist, in Wakefield Road, for some "syrup of violets, and oil of almonds," her child, of nine months, having a slight cough. A small dose of the mixture was given, when the child was taken very ill, and Mr. Procter, a medical man, was sent for. He at once discovered that the child had been poisoned, and applied the usual means to preserve its life, but the child died in three-quarters of an hour. It was found that a youth of 17, named Robert Watson, who had been with Mr. Cookson three weeks, on trial preparatory to being apprenticed, had mixed essential oil of almonds, instead of oil of sweet almonds, with the syrup of violets. He was accordingly taken into custody, and an inquest was held on the body of the child. The jury returned a verdict to the effect that the child had been accidentally poisoned, but they attached to their verdict an expression of opinion that Mr. Cookson, the druggist, was blamable in having employed an ignorant youth to administer drugs. Twelve of the jury (there being thirteen in the whole) returned this verdict, after a conference of more than an hour. The foreman intimated that he did not concur in it, and had in vain stood out for a more severe verdict,—manslaughter, against one or both of the persons implicated.

POISONED BATH BUNS.

A CASE occurred at Clifton on Friday, Dec. 16th, which might have been attended with fatal consequences had not prompt measures been taken to counteract the effects of some poisonous matter used in the composition of Bath buns, and which nearly cost the lives of six young gentlemen, pupils in one of the first boarding-schools in the place. The circumstances of the case were as follows:—Three of the youths had been walking at Redland, and purchased some Bath buns at the shop of a confectioner named Farr. In the course of the afternoon three other lads from the school

went to the same place and bought some more buns. In the evening all six were seized with violent sickness, and presented the symptoms of having partaken of some poisonous substances. Mr. Cross, surgeon, of Clifton, was called in, and prescribed the necessary remedies, but the patients continued so ill during the night that two of them were not expected to survive. Fortunately, however, but after great suffering, they all recovered. It was stated that chromate of lead had been used, as a cheap substitute for eggs, for the purpose of colouring the buns. Farr, on being sent for, admitted having used this preparation for some time, in the proportion of about six grains to each bun, without being aware of its injurious effects. One of the buns was analysed by Dr. F. W. Griffin, of the Bristol School of Chemistry, when it was found that no chromate of lead was present at all, but that the colouring matter was orpiment or yellow sulphide of arsenic, which had been supplied to Farr by a Druggist in the neighbourhood, in mistake for "chrome yellow," or chromate of lead.

SUICIDE BY CYANIDE OF POTASSIUM.

On Monday, Dec. 5th, Mr. J. Humphreys, coroner for East Middlesex, presided over a jury at the Three Crowns Tavern, East Road, City Road, for the purpose of inquiring into the circumstances connected with the death of Edmund Shirley, a photographist, aged 24, and Rosetta Greenwood, aged 18, who died from the effects of poison. The evidence adduced was to the effect that, on Wednesday, Nov. 30th, Edmund Shirley and Rosetta Greenwood engaged a bed at the Railway Coffee House, City Road, where they had been on former occasions. In consequence of not making their appearance in the morning, the door of the room was tried, and found to be fastened on the inside. A policeman was sent for, who forced open the door, when it was found that both were quite dead. A tumbler was found on one side of the bed, and a bottle, nearly empty, labelled "Poison;" both the deceased were lying apparently asleep. Two letters were produced, one written by Shirley to his father, to the effect that he was driven mad, and that he intended to destroy himself; the other was written by the girl to her aunt, to the same purport. It appeared that Rosetta Greenwood lived with her aunt, and obtained a living by dressmaking. On the Tuesday Shirley called to see her, and in the evening she went out with her aunt's consent. It was deposed by one witness that Shirley and the young woman called at her house on the Wednesday, when the former expressed a determination to destroy himself, and left a portrait for his father. This was taken to his father by witness, who described his son as having no home or shelter, but it appears that no steps were taken to relieve him.

Mr. George Love, surgeon, attributed death in both cases to the taking of cyanide of potassium.

A bottle containing the contents of the stomach having been produced, and the smell compared with the poison in the bottle, the Coroner summed up, and the jury returned a verdict in each case of "Death from the mortal effects of poison taken while in a state of unsound mind."

DEATH FROM PRUSSIC ACID.

On Monday, Dec. 12, Mr. Payne, Coroner, held an inquiry at the Portugal Hotel, Fleet Street, into the death of Mr. E. A. Lloyd, which was caused by prussic acid. It was stated in evidence that the deceased went to the hotel on the previous Monday and engaged apartments; the next morning he went out, and did not return till the Wednesday evening, when he appeared very vacant, and retired to bed; as he did not make his appearance in the morning, assistance was called in, when he was found in bed, dead; and under the pillow was found a two-ounce phial half-filled with prussic acid, but without any label. Mr. W. Churchill Dempsy, surgeon, stated that at the mouth of the deceased smelt strongly of prussic acid, which he was confident had been the cause of the death. Mr. Robert Hill, of Barnet, had for some time known the deceased, who was formerly a non-commissioned officer in the 1st battalion Rifle Brigade, and for the last four years had acted as dispenser to the regiment. The last time he saw him alive was on Nov. 9, at Portsmouth; and he had been expecting to see him, witness having lent him money, which he promised to return in a fortnight. That morning witness had received a letter from Portsmouth, stating that deceased had been absent from his regiment without leave. It was found that the deceased was son of Dr. Lloyd, of Bedford Row, and brother of

the present house-surgeon of St. Bartholomew's. In order to obtain further information, the investigation was adjourned to the following day, when Mr. H. D. Hatfield, uncle of the deceased, stated that his nephew suffered from a wound of the leg, which had been broken, and that he took laudanum to allay the pain, and witness had often seen laudanum in his possession, but not prussic acid. This was confirmed by a former witness, Mr. Hill. The Coroner then summed up, and the jury returned a verdict of "Accidental death from an overdose of prussic acid, taken medicinally to allay pain and procure sleep."

MISCELLANEA.

Production of French Perfumes.—The chief places of their production are the south of France and Piedmont, namely, Montpellier, Grasse, Nismes, Cannes, and Nice; these two last, especially, are the paradise of violets, and furnish a yearly produce of about 13,000 lb. of violet blossoms. Nice produces a harvest of 100,000 lb. of orange blossoms, and Cannes as much again, and of a finer odour. 500 lb. of orange blossoms yield about 2 lb. of pure Neroly oil. At Cannes the acacia thrives particularly well, and produces yearly about 9,000 lb. of acacia blossoms. One great perfumery distillery at Cannes uses yearly about 140,000 lb. of orange blossoms, 20,000 lb. of acacia blossoms (*Acacia Farnesiana*), 140,000 lb. of rose-leaves, 32,000 lb. of jessamine blossoms, 20,000 lb. of violets, and 8000 lb. of tuberoses, together with a great many other sweet herbs. The extraction of the etherial oils, the small quantities of which are mixed in the flowers with such large quantities of other vegetable juices that it requires about 600 lb. of rose-leaves to win one ounce of otto of roses demands a very careful treatment. The French, favoured by their climate, are the most active, although not always the most careful, preparers of perfume; half the world is furnished by this branch of their industry.—*Athenæum.*

A New Plaster.—M. Pasquier, of Roubaix, has exhibited to the Academy leaves of gutta-percha mixed with peroxide of iron, which he has long employed in the dressing of fractures and complicated wounds. The leaves soften in boiling water, and may be then readily applied around the limb, around which they become moulded, and lose none of their consistence through the heat of the body. After amputation he uses nothing but this gutta-percha—neither charpie, compress, or bandage.—*Medical Times.*

Removal of "Scale" from Steam-Boilers.—A series of experiments have been carried out at Portsmouth, on board Her Majesty's paddle steamer *Wallace*, which have proved highly successful. Under the old system all the boiler doors have to be taken off, and a number of men are required to remove the scale by manual labour; but by the system which has now been tested on board the *Wallace*, one door only of the boiler has to be taken off, to allow of the introduction of the steam pipe. The boiler to be acted upon is then filled with superheated steam, at a temperature of 400° of heat. This acting upon the saline deposits on the surface of the tubes and other parts of the boiler, expands and disengages it. After this the boiler is again filled with water, and the steam got up in the usual manner, and kept up for a few hours, and on afterwards "blowing off" the boilers, they are found to be perfectly free from scale.

The Tea Tree in India.—Mr. Henry Mann, an enterprising gentleman who left China about five years ago, has introduced the tea tree to Southern India, having formed a plantation on the Neilgherries, which is now flourishing. The Madras Government has lately published an interesting report upon the subject. The plantation is situated about two miles and a half above Coonoor, at an elevation of 6000 feet, with an exposure to the north-east, and contains about 6000 plants. The ground occupied is about four acres. The plantation is on a slope. The forest land is found most suitable for the plants. It now only remains to test the leaf and to procure skilled manufacturers. This the Government were asked to do by the Conservator of Forests, but the application has been refused on the grounds of the inexpediency of Government interference with private enterprise. The importation of skilled manufacturers on speculation will not probably be ventured upon by any private individual for many years. The cultivation of tea in the hill districts of India seems to be spreading fast, and as these are the localities recommended for European colonization, we may yet see India rivalling China in this trade, and sturdy Anglo-Saxon pickers depicted on the tea chests instead of almond-eyed, long-tailed men of China.—*Bengal Hurkaru.*

Cleaning Glasses and Capsules.—There is often a difficulty in cleaning glasses or porcelain capsules to which organic matters have adhered, and in course of time become so hard and dry that they resist all solvents. The following process will be found to answer in almost every case:—

The spots to be cleaned are moistened with concentrated sulphuric acid, and powdered bichromate of potash is sprinkled upon the acid; the objects are then left standing for some hours (through the night) in a moderately warm place. All organic matters are by this means destroyed, with formation of sulphate of chromium, which may be removed by water with the residue of the acid.—Dingler's *Polytechn. Journal*, cl., p. 378, and *Chemical Gazette.*

BOOKS RECEIVED.

The Literary and Scientific Register and Almanack for 1860. Dedicated by special permission to, and under the immediate patronage of, His Royal Highness the Prince Consort. By J. W. G. Gutch, M.R.C.S.L., &c. London: W. Kent and Co., 86, Fleet Street. (Nineteenth year.)

This annual register contains, as usual, a large amount of very useful information.

The Chemical News, *with which is incorporated the "Chemical Gazette."* Nos. 1, 2, and 3. (From the Editor.)

TO CORRESPONDENTS.

An Apprentice (Lutterworth).—The directions alluded to are incorrectly copied. The translation should be as follows: "Apply blistering tissue, 2 inches by 2, to each side of the chest, and repeat the application after the expiration of a week."

Chemicus (Manchester).—*Sulphur lotum*, is sublimed sulphur washed.

J. H. (Manchester).—The dose is large, but would produce no inconvenience.

A. B. (Northampton).—Fownes's *Manual of Chemistry*, Mohr and Redwood's *Pharmacy.*

A. P. S. (Liverpool).—The *Quarterly Journal of the Chemical Society*, published by Baillière, price 3*s.*

E. P. (Tredegar) should apply by letter to the Secretary, 17, Bloomsbury Square.

J. G. F. R.—The Alkaline Solution of Copaiba, alluded to, if made according to the directions given, should be clear. It is sometimes called "Soluble Copaiba."

C. T. (London).—(1). Negretti and Zambra, Hatton Garden.—(2). Pepsine Wine. vol. xviii., page 197. The suggestion relating to the admixture of Madder with poisons, would be of no practical value.

Registered Apprentice (Preston).—Balfour's *Manual of Botany*, price 12*s.* 6*d.*—Beasley's *Druggist's Receipt Book.*—Hoblyn's *Dictionary of Scientific Terms*, price 10*s.*

C. H. B. (Brompton).—The processes for the preparation of cod-liver oil with quinine, iodide of iron, &c., will be found in vol. xvii. p. 36 of this Journal.

A Registered Apprentice.—Indian opium is not an article of commerce in this country, nor is its quality, as compared with Turkey opium, such as to render it desirable that it should be introduced. Egyptian opium is also very inferior to Turkey opium, and ought not to be used for any pharmacopœia preparation.

T. H. R. (Seaham Harbour).—It is well known that vulcanised india rubber, under particular circumstances, loses its elasticity, the sulphur separating in a crystalline form.

Pharmacologist.—(1.) It is supposed that the student will pursue his studies where means exist for acquiring the knowledge referred to. (2.) Yes.

Inquirer.—No authority is required for suggesting improvements in existing formulæ.

Enquirer.—See vol. iii., p. 33, of this Journal.

A Well Wisher is thanked. The communication will probably be used.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. VIII.—FEBRUARY 1st, 1860.

PHARMACEUTICAL ARITHMETIC.

A CORRECT system of arithmetic lies at the foundation of all successful trading, and may be said to be to the man of business what optics and mathematics are to the astronomer; nor is there, perhaps, any occupation in which it is more necessary than in that of a Pharmaceutist, to be able to apply correctly the art of computation, in estimating the profits arising from transactions in trade, the intrinsic values of articles of merchandise, and the influence of a reckless competition in the price of articles, such as medicines, the consumption of which is scarcely affected by their cost. Erroneous calculations in these respects are fruitful sources of embarrassment, and there is reason to fear that the evils arising from such errors affect the members of our profession to a great extent, and tend to obstruct the attainment by the body at large of the position and benefits to which they are entitled.

It is subject of frequent complaint among Pharmaceutists, that while the cost of professional education has become greater than it was formerly, the profits of business have diminished, so that it is difficult now to acquire an income adequate to the requirements of a family by the mere exercise of the art of Pharmacy. This is often urged as an excuse by those who, having commenced life with a determination to confine themselves to the legitimate calling of a Pharmaceutical Chemist, are forced by necessity into other pursuits which may contribute to afford the required income. It is not that the demand for pharmaceutical labour has diminished, or that the value of this labour is less estimated by the public than was formerly the case, but rather that a change has taken place in other circumstances affecting the Pharmaceutical profession, and that these circumstances are not sufficiently taken into account by the Pharmaceutical arithmetician.

Formerly the trade of a Chemist and Druggist was thought to be one offering the means of easily acquiring a moderate income. The cost of apprenticeship, although higher than in many other trades, was not excessive; the capital required for commencing business was comparatively small; and the profits, comparing isolated transactions with those in other trades, appeared to be very great. Then it was thought to be a genteel trade, requiring a greater amount of school-learning than most others, involving the exercise of scientific knowledge, and partaking in some degree of the character of a profession. Parents of respectable position but with limited means, who had sons to establish in life, were anxious to bring up one as a Chemist and Druggist. This, as a business distinct from the practice of medicine, arose out of that of the ancient Apothecary. The Apothecary taking the place of the Physician, the Chemist and Druggist became what the Apothecary previously was, excepting, indeed, that he was generally more thoroughly a man of business, and, in the majority of instances, added other merchandise to that of medicine. This difference

proved to his advantage. He was a more substantial man than the old Apothecary, and often grew into wealth, or at least attained to easy circumstances. Coeval with the rise of this class of professional tradesmen was the system which may be called the Apothecaries' system in medicine, consisting in the treatment of disease by the administration of large quantities of medicine. The Physician, like the Apothecary, ordered his medicines in "Draughts, to be taken three times a day," and fortunate was the Druggist who had a good run of dispensing business in those times.

But changes have gradually been taking place, which in the course of half a century have given a new character to the aspect of affairs. The Druggist, sensible of the importance of his position, stimulated with ambition by observing the scientific honours conferred upon his brethren in foreign countries, mortified by a comparison of their scientific acquirements with his own, and goaded into action by attempts made to interfere with the independent exercise of his business on the plea of a deficiency in his professional qualification, has sought to remedy the defects existing, or supposed to exist, in these respects, has taken a higher scientific standing, and established a better system of professional education for those who shall be his successors. Pharmacy has become a scientific profession, and the appellation of Chemist and Druggist is relinquished for that of Pharmaceutical Chemist by those who are now the legally recognized dealers in, and dispensers of, medicine.

Concurrently with the change adverted to, other changes have occurred, and among the most important of these has been the relinquishment of the old Apothecaries' system in the treatment of disease, and the gradual introduction of remedies in a more and more compendious form. Draughts have been superseded by mixtures, and mixtures by drops. So in like manner the electuary and bolus have given place to the more elegant form of pill. Instead of the "draught three times a day," with a fresh supply every two days, there is now a bottle of drops which lasts a fortnight. A change has also taken place to some extent in the nature of the remedies as well as in their mode of administration. The complex formulæ which prevailed in the two previous centuries have been gradually superseded by more simple forms, and remedies now generally partake of a more definite as well as a more simple character than formerly. The discovery and isolation of the active principles of many vegetable substances, have contributed to this result. We thus have the definite and unvarying preparations of morphine and quinine in the place of the less definite and always, to a certain extent, variable preparations of opium and cinchona. Chemical products are much more extensively used now than was formerly the case, and the Pharmaceutist has to provide himself with a large number of chemical preparations, many of which are costly as compared with the antiquated Materia Medica of past ages.

Comparing the state of Pharmacy now with what it was half a century ago, it may be said that the remedies employed are now generally more definite and uniform in their constitution, that they are more powerful in their action in the concentrated state in which they are often kept, that they are more costly, that a greater amount of scientific knowledge and practical skill are required for preparing and dispensing them, and that much more responsibility is involved in supplying them to the public, than was formerly the case.

It will perhaps be conceded that the qualifications of those engaged in the practice of Pharmacy have kept pace with the requirements of the altered circumstances by which they have been surrounded, that those who now enter the business are better educated than formerly, that they devote more attention than did their predecessors to scientific studies, and that their establishment in business, if effected with a reasonable prospect of success, involves the application of a larger capital than used to be required.

In connexion with these increased items with which the business of the Phar-

maceutist has to be debited, it would be reasonable to expect that there should be a corresponding increase in the credits. But is it practically so? On the contrary, is there not a marked diminution in the rate of remuneration now generally obtained for dispensing medicines? We believe this will be admitted to be the case by all those whose experience enables them to form a correct judgment. It would thus appear that, with increased business expenses, increased qualifications and responsibilities, there are diminished profits.

It would be a great error to suppose that the income of the Pharmaceutist could be successfully and permanently improved by resorting to a system of under-selling. The consumption of medicines cannot, to any sensible extent, be increased by a reduction in their price, the demand being limited by other circumstances. Those, therefore, who commence a system of competition in price, with the view of getting increase of business, and thus improving their incomes, will sooner or later suffer from the injury they inflict upon all the members of the trade. There is reason to believe that a very erroneous method of calculation is sometimes adopted with regard to the price of medicines, and especially with reference to the dispensing of prescriptions.

A prescription ordering two pills is presented to a Pharmaceutist for preparation. The prescription is badly written in bad Latin. It has to be deciphered and translated. The pills contain several ingredients, which are to be accurately weighed, and formed into a plastic mass by the aid of certain excipients which the experience and skill of the dispenser must suggest. The mass is divided into pills which are put into a box, and the directions neatly and legibly written on the cover. The box is to be wrapped in paper and sealed. The prescription is copied into a book, and then enclosed in an envelope. Now, what is a fair remuneration for all this work? The usual charge would, perhaps, be threepence. Is the profit upon the transaction to be estimated by comparing the cost of the ingredients contained in the pills with the sum charged? Shall the Pharmaceutist be told that he gets ninety per cent. profit because the cost of the ingredients is but the fraction of a penny? We believe a correct calculation in such a case would show that there was no profit at all in the transaction, and if the business consisted of a mere repetition of such transactions, it could not be carried on successfully.

When the administration of medicines in the pilular form was less frequent, and draughts and mixtures more generally prevailed, the want of profit in the one was compensated for by that which accrued from the others; but if draughts and mixtures should be replaced by drops, while the scale of charges remains as at present, the advantage of a dispensing business for affording means of applying scientific knowledge, practical skill, and mental labour to profitable account, would become very questionable. It would be necessary in such case to reconsider the scale of charges for dispensing, and to adjust it in accordance with sound arithmetical calculations.

In many instances, we believe, those engaged in business, with a moderate share of dispensing, find it difficult to account for their slender means, while the profits of their business, when calculated with reference to isolated transactions, appear to be ample. The disappointment experienced in such cases arises, of course, from errors of calculation. These parties may be anxious to discharge their duties conscientiously, but how great is the temptation which the wholesale dealer presents to them in the shape of cheap drugs. Were they carefully to scrutinise these drugs, correctly to estimate their intrinsic values, and then to compare them with the higher priced articles, they would probably find the latter to be the cheaper of the two. The system of under-selling in reference to pharmaceutical preparations, such as tinctures, syrups, extracts, &c., cannot be too strongly deprecated, nor can the temptations of cheap price-lists be too firmly resisted by those who desire to maintain a good reputation, and to secure for themselves, and those with whom they are associated, the confidence

of the medical profession and the public. While seeking to gain recognition as men qualified for the responsible duties they have to perform, and thus taking a position as members of a scientific profession, it behoves them not to allow the rate of remuneration for such duties to sink to a level with those of traders whose qualifications and responsibilities bear no comparison with theirs. The members of every profession find it necessary to establish a scale of remuneration for professional services, which is generally recognized among themselves, and bears some relation to the nature of the qualifications required; and Pharmaceutical Chemists, in taking the position assigned to them by the Legislature, must not lose sight of this important consideration.

SALE OF DANDELION COFFEE.

In the article on this subject in our last number, at page 348, it is stated that a suggestion had been made, with the view of obviating the difficulty attending the sale of dandelion mixed with coffee, without infringing the law, that cocoa should be substituted for coffee, it being assumed that no licence was required for the sale of cocoa. The following letters have been received from the Inland Revenue Office in reference to this subject, from which it appears that cocoa cannot be used as suggested :—

"*Inland Revenue Office, W.C., 2nd January*, 1860.

"Dear Sir,—In the article 'Sale of Dandelion Coffee,' in the *Pharmaceutical Journal* for this month, I observe the statement, that 'for the sale of cocoa no licence is required.' Will you allow me to explain to you that this is a mistake. No person can legally sell cocoa unless licensed for the sale of tea, coffee, and cocoa.

"I am, dear Sir, very truly yours,

"T. Redwood, Esq." "Tho. Dobson.

"*Inland Revenue Office, London, 4th Jan.*, 1860.

"Dear Sir,—I beg to reply to the questions in your note of the 2nd.

"The Excise licence under which cocoa is saleable, is for the sale of tea, coffee, cocoa, chocolate, and pepper.

"A licence is not required for the sale of vinegar.

"It is clear that the Board could not authorize the mixture of dandelion with cocoa, or the sale of an article called dandelion cocoa, for the law imposes a penalty of £100, and forfeiture of the goods, upon any cocoa-dealer keeping any vegetable substance as an imitation of, or substitute for, cocoa, or calling any such substance by 'any name of cocoa.' The *law* in this respect is exactly the same as with respect to coffee, the difference being that the mixture of chicory with coffee, under certain restrictions, has been allowed by authority of the Treasury, while no similar authority exists regarding cocoa.

"I am, dear Sir, very faithfully yours,

"Tho. Dobson,

"Theophilus Redwood, Esq.' "*Assistant Secretary.*

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th January*, 1860,

Present—Messrs. Bird, Brew, George Edwards, Hanbury, Haselden, Hollier, Lescher, Morson, Squire, and Waugh,

Mr. Edward Charles Cortis Stanford* was elected a
MEMBER.

MAJOR EXAMINATION, *17th January.*

Austin, Henry Felix.....London
Delf, Frederick Daniel .....Southampton
Hartley, William .....Birmingham

MINOR EXAMINATION.

Bourdas, Isaiah .....London
Clayton, Henry .....Lewisham
Francis, Robert Dolbey..... .....Bishop's Castle
Marten, Henry Oake.....Newfoundland
Moon, William Henry .....Ilfracombe
Watson, James .....Barking

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Beale, Charles George	Mr. Atkins	Salisbury
Beale, Frederick Wilson	Mr. Atkins	Salisbury
Browne, James	Mr. West	Coventry
Douglas, Archibald Henry	Messrs. Argles, Son, & Stonham ...	Maidstone
Gray, Thomas	Mr. Morris Banks	Birmingham
Hoskyn, Montague J.....	Mr. Pearce	Southampton
King, James Hurman	Mr. Stroud	Bristol
Shephard, Thomas Frederick ...	Messrs. Schweitzer & Co.	Brighton

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued*).

Amount previously advertised, £1622 16*s.* 6*d.*

	£	s.	d.
Allanson, Charles, Harrogate	0	10	6
Amoore, Charles, Hastings.....	1	1	0
Appleton, Thomas C., 45, Curzon Street, Mayfair	1	1	0
Beesley, Thomas, Banbury.....	1	1	0
Bird, Alfred, Birmingham	1	1	0
Bower, William, 96, Tottenham Court Road	1	1	0
Cathrow, William, M.R.C.S., 42, Weymouth Street	1	1	0
Chemical Discussion Association, 17, Bloomsbury Square ...	1	1	0
Coupland, Joseph, Harrogate	0	10	6
Crosse and Blackwell, 21, Soho Square.....	5	5	0
Davis, Richard H., Harrogate.....	0	10	6
Dullan, John, Harrogate.....	0	10	6
Farrant, Robert, Salisbury	1	0	0
Foulger, Samuel, 133, Great St. George's Street East	5	0	0
Gossett, Major Arthur, Eltham, Kent	1	1	0
Greenwood, John, Harrogate	0	10	6
Guy, Guy, Helston	0	5	0
Hogg, Henry, Bristol	0	10	0
Holland, Charles, M.D., St. Chad's, Lichfield	1	1	0

* Passed his Examination as "Edward Charles Cortis," and has since taken the name of "Stanford."

	£	s.	d.
Hudson. Richard, Kendal	1	1	0
Jones, Oliver Ellis, Welshpool	1	1	0
Kernot, Joseph, Naples, per Evans, Lescher, and Evans	1	1	0
Kernot, Septimus, Naples, " "	1	1	0
Letheby, Henry, M.B., Ph.D., 41, Finsbury Square	1	1	0
Lever, William, Hastings	0	10	0
Mackenzie, The Hon. Mrs. Stewart, of Seaforth	1	1	0
Mackenzie, Mrs. G. Stewart	1	1	0
Medicus, per Mr. Coupland, Harrogate	0	10	6
Phytological Society	1	1	0
Read, James, Salisbury	1	0	0
Rees, G. Owen, M.D., F.R.S., 26, Albemarle Street	1	1	0
Roe, Septimus, Salisbury	1	0	0
Samwell, Francis, P.B., F.R.C.S., 52, Margaret Street	1	1	0
Smith, William, Woolwich	1	1	0
Steele, John W., York	0	10	0
Tabor, Henry, Salisbury	0	10	0
Taylor, Thomas, Staleybridge	1	1	0
Tryon, William G., Landport	0	10	6
Whitlock, Edwin W., Salisbury	1	0	0
Wilson, John, Harrogate	0	10	6
Wood, Edward, Brighton	1	1	0

CORRECTIONS IN THE BELL MEMORIAL LIST.

Page 209, *omit* Brocklehurst, James, £1 1*s*.
" 229, *omit* Cursham, George. M.D. (entered page 350), £1 1*s*.
" 350, *for* T. Weber, *read* F. Weber.
" " *for* William N. Gall, *read* William W. Gull.
" " *for* John Spurgeon, *read* John Spurgin.
" " *for* R. Gueneau de Mussy, *read* H. Gueneau de Mussy.

PHARMACEUTICAL MEETING.

Wednesday, January 4th, 1860.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY

were announced :—

Journal of the Society of Arts. From the Society of Arts.
Photographic Journal. From the Photographic Society.
Chemical News. From the Editor.
Quarterly Journal of the Linnean Society. From the Linnean Society.

The following communications were made :—

ON THE PREPARATION OF LARD.

Mr. Hills stated, that having been requested by Dr. Redwood to give his experience on the preparation of lard, he begged to make the following remarks :—

Having experienced great difficulty in obtaining lard perfectly fresh and free from smell, and having tried a variety of plans, such as getting it as a favour from wholesale houses, or inducing farmer friends to make it expressly, and also having it made on our own premises, none of which succeeded to my satisfaction, I at last thought of a plan of preparing it in the same manner as marrow is prepared for pomade, by separating all the membrane from the *omentum* (flare), then breaking up the fat in a mortar, and well washing it in water.

The plan adopted was as follows:—Get a large pan made of tinned iron, having a perforated diaphragm standing on four or five feet within two inches of the bottom, under which there is a hole about half an inch in diameter for the water to run away. Then place this pan in a sink, or some convenient place where a running stream of water can be applied, and having nearly filled the pan with water (first stopping the hole at the bottom with a cork), put in the broken-up mass, and wash it by squeezing into thin layers in the water, keeping the water constantly running. After which it is set on a colander to drain, and then melted by means of a steam or water bath. It is then placed in jars for use. Great care should be taken not to allow a particle of water to remain in the prepared lard.

Benzoated lard may be prepared in the same way; throwing in the bruised gum benzoin, and allowing it to remain in contact about two hours.

Prepared lard (the *Adeps* of the London Pharmacopœia) made by the foregoing process is deprived of the peculiar fatty animal smell, is whiter than that usually found, and will keep longer.

Mr. Buckle said the process of washing the fat before melting it was new to him; he had usually done it after melting. He found it desirable to reject that part of the flare which immediately surrounded the kidneys and ureters, as this usually had a disagreeable odour; and if the separation of this was carefully attended to, he thought a perfectly good and odourless lard could be obtained by the usual process.

Mr. Wright recommended the process usually adopted by perfumers, which consisted in cutting up the flare, boiling it with water, and then adding a small quantity of alum, which caused the separation of some impurities.

Mr. Hills considered it important to remove all matter soluble in water before melting the fat, as otherwise these substances would impart a certain odour to the lard, and render it more liable to become rancid.

ON PILULÆ.

BY MR. B. S. PROCTOR.

In my communication upon some of the Pharmacopœia preparations, printed in the *Pharmaceutical Journal* for July last, I suggested one or two alterations in our pilulæ.

Though you have since then had several contributions on the same subject from other sources, there is much yet to be done. I therefore now offer another mite towards its accomplishment. Some of my present suggestions are in direct opposition to some of those recently made, and my object in bringing them forward is not to supersede the recommendations of others, but to notice one or two considerations which appear to have escaped their notice, and to show the necessity of attending to the wants of all classes rather than to be guided by the experience of one individual, or class of individuals.

The physician prescribes, or the College requires, certain active medicines to be made into a pill mass.

The problem of the Pharmaceutist is to give to the mass plasticity, freedom from liability to change, and ready solubility in the stomach, and to accomplish these with as little outlay of money and labour as may be.

The difficulty or impossibility of attaining perfection in these requisite qualities, makes it desirable that we should avoid the liability to change, and obtain the ready solubility in the stomach, by preparing only small quantities of the masses as they are wanted, and economy of time demands that the labour of going through the whole process of weighing, powdering, mixing, and beating be not required of us every time a little Pilula Galbani Composita is wanted. The means by which this is to be attained is evidently to have the ingredients

mixed in powder, requiring only the addition of a definite quantity of water or other excipient to convert them into a mass of the requisite qualities.

That this change would be acceptable to many is shown by the frequent demand for Pulvis Pilulæ Colocynthidis Compositæ, Pulvis Pilulæ Rhei Compositæ, &c. Mr. Muskett* objects to such preparations as powder of Plummer's pill, on the ground that mixed powders have a tendency to separate on standing; but such an objection, though in this case theoretically, or even practically true, will not apply to the Pharmacopœia pills as a class, any more than it will to Pulvis Jalapæ Compositus, Pulvis Ipecacuanhæ Compositus, Pulvis Confectionis Aromaticæ, &c., which preparations have never been considered objectionable in this respect.

It has been recommended† to liquify the various ingredients with the aid of heat, water, &c., by which means a very perfect mixture is obtained, and the mass will better stand the scrutiny of a microscopic examination, *but this is a theoretical advantage not of practical importance;* at the same time it generally imparts great toughness, and a tendency of the pills to fall out of shape; *these are practical disadvantages.* I have had very little experience in the melting process, but I anticipate that it would be a great convenience to makers of pill masses on the large scale, obtained at the cost of great inconvenience to those who make only on the small scale, to those who use them in dispensing, and to those who swallow the pills.

Unfortunately, those who make pills, especially the wholesale makers, rarely have the opportunity of examining the condition of their workmanship after it has stood the test of a few weeks or months' keeping in the hands of the patient. The skilful dispenser who prides himself upon his accuracy and care, would often be ashamed of his work if he could see it a few weeks old.

A series of experiments which I tried some time since, though designed to yield information to be used in dispensing, elicited a few facts which may usefully aid our present purpose.

A variety of medicines were made into pills with treacle, soft soap, conserve of roses, and glycerine. After a few months' keeping an examination showed that those prepared with glycerine had most effectually retained their soft condition.

A specimen of Pulvis Pilulæ Rhei Compositæ (prepared according to the London Pharmacopœia, but using powdered soap instead of soft soap, and omitting the treacle) made into a mass with glycerine was, while new, rather deficient in tenacity, but became tough on keeping for a few weeks, and retained its toughness for several months. A specimen of the same, made into a mass with treacle, was tough while new, but by keeping became crumbly.

Other medicines which have not adhesiveness in themselves may be made into a good mass with a mucilage of the following composition:—

Powdered Tragacanth, ℥ij.
Glycerine, f℥ix.
Mix and add Water, ℥iv.

Prof. Redwood, in his *Practical Pharmacy*, says "the indiscriminate use of tragacanth cannot be too strongly condemned;" he might have added that, if judiciously applied, there are few substances so generally useful for imparting tenacity, or overcoming the inconvenience of hygroscopic extracts, &c. For the former purpose its union with glycerine prevents it giving an undue hardness and insolubility, and for the latter purpose it is necessary only to use it in the smallest effectual proportion. Thus blue pills frequently have an inconvenient stickiness, which is effectually removed by the addition of twenty grains of powdered tragacanth to one ounce of the mass, which small quantity does not impart an objectionable degree of hardness.

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* See *Pharmaceutical Journal.*

† By Mr. J. Boucher, in *Pharmaceutical Journal*, July, 1859.

A great number of pills contain aloes as their basis, and it, together with some other gum-resins, possesses abundant adhesiveness, but is very deficient in retentiveness of shape, nor is it an easy matter to supply this deficiency with any of the ordinary excipients unless used in very large proportion. Conserve of roses, tragacanth, &c., are very unsatisfactory. Soap and glycerine, or soap and treacle, answer very well if the soap is used in considerable quantity; but after numerous experiments I feel convinced that the most satisfactory method of managing this class of bodies is to add some ingredient of an insoluble and fibrous nature, which will form the framework of the pill; and, for this purpose, nothing is better than woody fibre in a fine state of division, such as is obtained by putting sawdust through a sieve 40 × 40 meshes to the inch. Six grains of this "Pulvis Ligni" with six minims of glycerine will form thirty-six grains of extract of aloes into a good workable mass, divisible into ten moderate sized pills, which retain their shape perfectly for six or eight months, and, though they become very tough, still yield to the warmth of the hand. I do not know any other excipient which will effect so much without making the pills inconveniently large. There will probably be a feeling with many against the use of so vulgar a material as sawdust; if so, it might be replaced by pure lignin, or in some cases by Pulvis Cinchonæ, &c.

Mr. Muskett objected to my suggestion of omitting the Extract of Gentian in Pilula Aloes Composita, on the ground that the gentian increases the action of the aloes, and refers to Dr. Paris's Pharmacologia as his authority on this point. Dr. Paris's remark that bitters have the property of increasing the action of senna, and other aperients deficient in bitterness, scarcely appears to apply to such a medicine as aloes. If Mr. Muskett's view be correct, Pulvis Cinchonæ would answer the double purpose of improving the physical as well as augmenting the medicinal properties of this preparation.

If the requisite quantity of dry excipient, soap, lignin, or gum, were ascertained, and ordered to be rubbed with the medicinal ingredients of the pill, and then an ascertained quantity of the fluid excipient, glycerine, water, mucilage, or spirit, directed to be added to the others, and the whole formed into a mass, I think it might be very safely left in the hands of the operator to choose for himself whether combination would be most conveniently effected by the use of the mortar or the water-bath.

ON EXTRACT AND FLUID EXTRACT OF TARAXACUM.

Mr. Hills said—My experience leads me to think the best time to collect the roots is about the end of autumn or the beginning of winter, say the end of October to the end of November or the first ten days in December, after a little frosty weather, such as to dry the ground without penetrating too deeply.

Let the roots be well washed, and then crushed, either under mill-stones, between iron rollers, or in a large mortar with a heavy pestle, then press out the juice and strain.

To make Extract.—Boil the juice for a quarter of an hour, then strain through a flannel bag to get rid of the albumen, &c.; then evaporate to a proper consistence at a temperature of about 80° to 100° Fahrenheit.

The extract made by the foregoing process will keep for an indefinite time. When the juice has been merely brought to the boiling point, without the boiling above indicated, the extract has been found to spoil, becoming mouldy.

Fluid Extract of Taraxacum.—Take the unprepared juice, as before mentioned, and add thereto 25 per cent. of rectified spirit. Preserve in a cool place in glass or stone jars; allow it to deposit, and when required pour off the bright liquor; afterwards throw the precipitate on a filter, that the remaining liquor may pass through.

Fluid Extract of Taraxacum made from Dried root by Percolation.—

Wash, then dry the root; after which, grind it coarsely under mill-stones, or bruise well in a mortar. Then percolate it with the spirit (one part of rectified spirit and three parts water), using column pressure, and filter if required.

The reading of the above paper led to the following

REMARKS ON TARAXACUM ROOT.

BY PROFESSOR BENTLEY.

Professor Bentley said that he was very glad that the subject of taraxacum root, upon which several valuable papers had already appeared in the *Pharmaceutical Journal*, had been again introduced to the Members of the Society by a practical Pharmaceutist; for when he reflected upon its enormous consumption, and the unsatisfactory state of our present knowledge in many particulars respecting it, he thought it was very desirable that those who had experimented upon it should make known the results of their investigations.

He then proceeded to remark upon the best time for collecting taraxacum root for use in medicine. He said he found that Mr. Hills, like other Pharmaceutical Chemists who had written upon it, had indicated the latter end of October, the month of November, and the commencement of December, as the best periods for its collection; but so far as his experience went, which had already been published in the Journal some years since (see *Pharmaceutical Journal*, vol. xiv., p. 260), and which he had for the last seven years alluded to in his lectures, he believed that those were not the best months for the purpose. The reasons for thus collecting the root at the above times were—first, that its expressed juice was then richest in solid constituents, and thus yielded a larger amount of extract than at other periods; and secondly, the more uniform and pleasing appearance, and less deliquescent nature, of the extract then obtained. He then remarked that it was without doubt true, as shown by Mr. Squire and others, that dandelion root was in those months richest in solid constituents, but it by no means followed from this, that it was at the same time in the most active state for medicinal use; for its value as a medicine most certainly did not depend solely upon the amount of solid constituents it contained, but principally, if not entirely, upon the presence of a bitter principle, which had been termed *taraxacine*. One of the best evidences, therefore, of the value of taraxacum and its fitness for medicinal use, would be its taste at different periods; and here he could speak positively, as he had repeatedly tasted it in the several months of the year, and had arrived at the following results—namely, that it was most bitter in the summer months, more especially in July; almost as bitter in the beginning of March, should the weather be then favourable for the season, and the preceding month had not been very frosty; much less so in October, November, and the commencement of December, and least bitter in the winter months, in fact, even sweetish in frosty weather or directly afterwards. The cause which produced the increased amount of the bitter principle in the root in the spring over that of the autumn he did not attempt to explain; it was, no doubt, due to some chemical changes in the contents of the root of which we were at present entirely ignorant. From the above facts alone it would appear that in the summer months the root possessed the greatest medicinal value, next to them in the early part of March, then in the autumn, and least in the winter months. Practically, there were several difficulties in obtaining a satisfactory result in a Pharmaceutical point of view from the roots collected during the summer, and therefore he considered, taking every circumstance into consideration, that the end of February or beginning of March was, as a rule, the best time for collecting the root for

medicinal use ; or, should the season be very cold and the preceding months have been very frosty, then the time of collecting might be somewhat later. He was further convinced of the superior activity of the root at the above periods from being himself in the habit of taking the preparations of taraxacum as a medicine, and he had always noticed that those prepared in the spring were more active than those obtained at other periods. While thus referring to the medicinal properties of taraxacum root he could not but add his testimony to its value, its effects upon him being very decided and beneficial, and he had also seen the best results experienced by its use in others. He then said that he trusted that some Pharmaceutical Chemist would operate upon roots collected at the several periods mentioned above, and exhibit the results at a future meeting of the Society, and also at the same time place the different preparations in the hands of one or more hospital physicians in order that their activity might be properly tested. By such a course of proceeding we should soon come to a satisfactory conclusion as to the proper period for collecting taraxacum root for medicinal use.

While upon the subject of taraxacum, he said he should like to notice another circumstance connected with it, although not alluded to in the paper just read by Mr. Hills; he referred to the sweetish taste which the root possessed (as first noticed by Mr. Squire) after a frost, and which he had himself already referred to above. At present no explanation, so far as he was aware, had been given of the reason of this change of the taste of the root from its ordinary bitterness at other seasons. He had himself an opinion upon the subject which he would now lay before the meeting, but in the first place he must refer to changes of a somewhat analogous nature which had been observed in other plants and their parts under the influence of a frost. Thus, potatoes when frozen became sweet, which change was without doubt due to the conversion of their starch into sugar by the action of diastase. A similar conversion of starch into dextrin, and ultimately into sugar, he believed to take place frequently (much more so than was generally supposed), in the roots and other organs of plants during the winter months by the action of frost ; hence the quantity of starch present in any particular plant or its several organs at a certain period would depend in a great degree upon the temperature to which it had been exposed. He said that there were many important conclusions arising from a knowledge of the above facts, but that was not the time to allude to them, he should therefore confine himself then solely to their application to the subject before them, as follows:—Taraxacum root contained a substance called inuline, which possessed several properties in common with starch, to which it must therefore be regarded as very closely allied in its nature. Now inuline was even more readily converted into sugar than starch, and hence he believed an explanation was at once afforded of the sweetish taste acquired by taraxacum root after a frost—namely, the conversion of the inuline into sugar under the influence of frost in the same way as the starch of potatoes experienced a similar change under the like influence. That this was the true explanation of the change of taste in taraxacum root was further proved by its analysis at different periods of the year: thus, Overbeck found that the roots which had been collected in the spring contained but very little inuline, while one pound of the dried roots obtained in the autumn yielded two ounces and a quarter of that substance. Such a marked difference in the amount of inuline obtainable from taraxacum in the spring and autumn was at once readily explained if we believed in the conversion of inuline into sugar by the action of frosty weather. He also asked whether it was not probable that the deliquescent nature of the spring extract was also due to the same circumstance ? In conclusion, he said that he thought his explanation of the production of the sweetish taste of taraxacum root by frost was a rational deduction from observed facts, but he now left the matter to those who were much better chemists than he was, either to admit his conclusions, or to show their fallacy, and at the same time to suggest a better explanation.

Mr. Hanbury remarked, that in a valuable paper read at a meeting of the Society by the Messrs. Smith, of Edinburgh (*Pharm. Journ.*, vol. viii., p. 480), they had shown that *mannite* was produced in taraxacum root. Could it be formed in any way from inuline? Mr. Hanbury also stated that he thought there would be practical difficulties in the way of collecting the root in March, as now suggested, even should it be proved to possess the greatest activity at that period.

Professor Bentley said it was quite true that the Messrs. Smith, as well as two German chemists, Widnmann and Frickhinger, had independently proved, that mannite did not pre-exist in taraxacum, but was subsequently produced in the infusion or juice of the root by a species of fermentation (called *lactic* or *viscous*) out of the sugar, and also, they believed, from the inuline and other hydrates of carbon which existed ready formed in the plant. He said he could see no practical difficulty in the way of collecting the root early in March, as the young leaves of the plant were then very evident, and possessed all the botanical characters of those in a mature state, and the plant could thus be readily found and distinguished from all others with which it was likely to be confounded.

ON ARSENICAL FLY PAPERS.

BY R. H. BRETT, PH.D., M.R.C.S.,
Formerly Lecturer on Chemistry and Jurisprudence at the Liverpool Royal Infirmary School of Medicine.

My attention having been drawn to the subject of arsenical fly-papers, in consequence of a short notice from Mr. Draper, published in the November number of the *Pharmaceutical Journal*, I have made some further inquiries on this important matter, the results of which may not perhaps be uninteresting to your Members, especially as my experiments lead to the conclusion that the quantity of arsenic present in the fly-papers usually sold in the shops is frequently much larger than that given in the communication already referred to. The papers experimented upon were obtained from different shops; the greater number were those called "Papier Moure;" some, however, were from other makers.

These papers differed considerably in weight, the lighter weighing about fifty grains, the heavier from eighty-five to ninety grains. They were all well dried before weighing. These papers may be divided into two classes: the one, "Papier Moure," containing the arsenic in the form of *arsenic acid* combined with potash; the other, arsenious acid not combined with a base. Both sorts, when burnt, gave out the peculiar odour of metallic arsenic, but the papers called "Papier Moure" yield an ash having a strong alkaline reaction, from which ash water dissolves carbonate of potash, readily detected by the ordinary tests; the other class of papers do not furnish any potash by burning. When the "Papier Moure" papers are boiled with distilled water, a solution is obtained, which is precipitated white by a salt of lime, brick red by a neutral solution of nitrate of silver, and yellow by hypo-sulphite of soda and muriatic acid when heated, indicating the presence of *arsenic acid*. Both sorts of paper, when boiled with diluted muriatic acid and bright copper wire, deposit metallic arsenic upon the copper surface, which deposit, when heated in a test tube, furnishes a crystalline sublimate of arsenious acid. The metallic arsenic is, however, more readily thrown down from the papers, where the arsenic exists, in the form of uncombined *arsenious acid* than from the other description; the experiment, nevertheless, is sufficiently striking in either case. The watery solution of the arsenious acid papers is precipitated yellow by ammonio-nitrate of silver, green by ammonio-sulphate of copper, and, after the addition of muriatic acid, yellow, by sulphuretted hydrogen, indicating arsenious acid. The quantity of arsenic acid in the paper called "Papier Moure" was determined as follows:—
A given weight of the paper was boiled with pure muriatic acid, and the filtered

fluid submitted to a current of sulphurous acid gas, in order to reduce the arsenic to the state of arsenious acid; the fluid was then boiled to expel any excess of sulphurous acid, and then sulphuretted hydrogen passed through for some time. If the reduction of the arsenic to the state of arsenious acid be not effected by the means above noticed prior to the use of sulphuretted hydrogen, the whole of the arsenic is with difficulty got down, and hence, I believe, in some cases where this precaution is not used, the actual quantity of arsenic is considerably under-estimated. The fluid containing the sesqui-sulphuret of arsenic is then heated for some time, and the precipitate collected upon a weighed filter, and the whole carefully washed, dried, and weighed. The filter, with its contents, is afterwards heated with nitric acid, s. g. 1.5; the sulphuric acid thus formed converted into sulphate of baryta, from the weight of which the whole amount of sulphur is determined; the weight of the original precipitate, less the quantity of sulphur, gives the amount of metallic arsenic, from which the equivalent either of arsenic or arsenious acid, as the case may be, is readily deduced. The quantity of arsenic in the arsenious acid papers may be determined in the same way; it is not, however, necessary to employ the reducing agency of sulphurous acid in the latter case, because the arsenic already exists as arsenious acid; and is then readily thrown down from muriatic acid solutions by sulphuretted hydrogen. Subjoined is the per-centage of arsenic and arsenious acid in the "Papier Moure" and arsenious acid papers respectively:—

"Papier Moure."

Samples.		Per cent.
No. 1.	Arsenic Acid	8.42
" 2.	"	9.75
" 3.	"	8.12

Arsenious Acid Papers.

Samples.		Per cent.
No. 1.	Arsenious Acid.....	15.0
" 2.	"	7.0
" 3.	"	8.2

It will be seen from the above statement that the quantity of arsenic in these several papers, estimated as *arsenious acid*, does not materially differ, with the exception of one of the arsenious acid papers, where nearly double the amount was obtained; indeed, it was found that when only about two square inches of this paper were boiled with fine copper wire and diluted muriatic acid, so much metallic arsenic was separated that the latter came off the copper surface by simple agitation in water in the form of small black flakes. As the "Papier Moure" gives a bitter-sweet extract to alcohol, it was examined for strychnine; this alkaloid, however, could not be detected. I have reason to believe that the bitter taste is due to quassia mixed with a little saccharine matter. The average weight of the fly-papers operated upon may be taken at about 69 grains, and the average per-centage of arsenic, estimated as *arsenious acid* (not including the paper yielding 15 per cent.), at about 7.69 grains, thus giving to each paper as much as 5.3 grains of arsenious acid. It may well be asked, should such papers be allowed to be sold at all? Such, however, is the fact, notwithstanding that two or three of them contain sufficient arsenic to poison a whole family.

Birkenhead, January 2nd, 1860.

PHYTOLOGICAL SOCIETY,

IN CONNEXION WITH THE PHARMACEUTICAL SOCIETY.

The Annual General Meeting for 1860 was held at 17, Bloomsbury Square, on Wednesday, January 11th;

DR. T. REDWOOD IN THE CHAIR.

The following Report of the Committee was read:—

"In consequence of the great difficulty which had been for some time expe-

rienced in maintaining the Society in an effective working condition, a proposition was made previous to the last anniversary meeting for its dissolution, and a general expression of opinion was elicited from the Members upon the subject. The result, however, led to the hope that by a stronger effort on the part of the existing Members, and the adoption of a different line of action, the difficulties of our position might be ultimately overcome, and fresh energy be infused into our proceedings.

"The continuance of the Society was, therefore, resolved upon; but the Committee, in re-entering upon their duties, and carefully examining the task before them, found it necessary to indicate to the Members, in the form of a special report, the course they proposed to adopt, and to ask of them their active co-operation.

"The Society's herbarium of reference, containing about 800 species, required revising and re-arranging; the duplicates were to a great extent in confusion, and very inconveniently placed. It was obvious that before commencing an efficient and practical circulation of specimens, it would be necessary to make an entire revision of the whole collection; to ascertain that none but suitable specimens were put up for exchange; that the labelling of each plant was correct; and, finally, to have such an arrangement that any particular genus or species could be got at with only a moment's trouble. They, therefore, organized a Working Committee, consisting of the most active London Members, as determined upon at the Annual General Meeting, and provided a more suitable and efficient means for storing the duplicates for exchange. Meetings of this Working Committee have been held, usually twice a month, through the past year, and the whole of the duplicates, with the exception of a few parcels which yet remain on hand, have been examined and arranged. A catalogue of these, indicating the number of specimens of each plant, has been prepared, and will be circulated with the present Report.

The Committee are therefore now in a position to undertake the circulation of specimens more advantageously than has hitherto been the case. The Members will be in possession of an exact list of the available duplicates and the number of specimens in the Society's possession, and the Curators will be able with the utmost facility (providing the No. of the British Catalogue is attached) to select any that may be applied for. The Members will also be able to ascertain from the Catalogue the plants deficient in the Society's collection; and it will be the future duty of the Working Committee to examine and arrange the parcels of donations as they are received. The herbarium of reference also remains for revision.

"No papers have been read at the ordinary Meetings during the past year, but several specimens have been exhibited, and communications made upon subjects connected with the vegetable materia medica, economic botany, &c.

"At the foundation of the Society several Members joined, who paid their entrance fee and subscription, but have never since communicated with the Society; some of these names have therefore been removed from the list of Members by the Committee.

"In conclusion, the Committee would earnestly impress upon the Members the fact that the future existence of the Society depends upon their individual exertions. The Committee have endeavoured to prepare the way for greater activity and increased interest in the proceedings of the Society, and hope to be able in future to more rapidly satisfy the requirements of the Members; they now therefore appeal to all those who are truly desirous of preserving the Society, and who believe it still possible to carry out the objects for which it was instituted, to unite together and give them their hearty co-operation."

The following resolution has been adopted by the Committee:—

"That this Committee do recommend to the General Meeting of Members, to be held in January ,that the sum of One Guinea be subscribed in the name of the Society to the Jacob Bell Memorial Fund."

The Treasurer's Report showed a balance in hand of £3 7*s.* 7*d.*

It was resolved, "That the Report of the Committee be adopted, and that the sum of one guinea be subscribed to the Bell Memorial Fund in accordance with the recommendation of the Committee."

CHEMICAL DISCUSSION ASSOCIATION
OF THE PHARMACEUTICAL SOCIETY.

The second anniversary meeting was held at 17, Bloomsbury Square, on Monday, January 9th;

DR. T. REDWOOD, PRESIDENT, IN THE CHAIR,

The following Report of the Committee was read:—

"At the last anniversary meeting the Committee had occasion to congratulate the members upon the success which attended the establishment of the Association. It is their present gratifying duty to report that since that period the progress of the Association has been such as to fully realize the expectations of its promoters.

"Up to the present time thirty-three candidates have been admitted members.

"Eight ordinary meetings have been held during the past year; these have been regularly and well attended by the members, and a good supply of subjects brought forward for discussion. The Committee would take this opportunity of pointing out that it is upon the individual exertions of the members in these respects that the efficient working condition and future success of the Association depends.

"It will be observed in the Treasurer's accounts that the Association is in debt to a small amount. This has arisen from the extra expenditure in printing, books, cabinet, &c., which were requisite in the establishment of the Association, but which will not be again incurred. The Committee have no doubt that the income from the present subscriptions will be amply sufficient to meet all necessary expenses."

The following is a summary of all the communications which have been made since the foundation of the Association:—

"On the Volatility of the Arsenic in Green Paper-hangings." By Mr. J. Williams. Nov. 1, 1858.

The Author stated that, in June, 1857, he was applied to by Dr. Halley to assist him in the detection of arsenic in the air of a room which was papered with a flock paper highly charged with arsenite of copper. The means adopted by the author to effect this object were as follows:—Twelve sheets of fine white bibulous paper were saturated with a solution of ammonio-nitrate of silver (prepared by dissolving two drachms of nitrate of silver in a pint of distilled water and adding two drachms of liquor ammoniæ), and suspended, while still moist, from strings passing across the room. Two gas-burners were lighted and the room closed for about twenty hours, the gas being allowed to burn for about ten hours only. The papers were then taken down, and ten of them, now much blackened, were digested in five fluid ounces of pure hydrochloric acid at a temperature short of boiling water for half an hour. The clear liquid was decanted, and boiled for two or three minutes with a thin coil of pure copper foil, and then digested in a sand-bath for two hours. The copper speedily acquired a steel grey colour, which, however, was accounted for by a trace of silver held in solution by the hydrochloric acid. The copper was removed, thoroughly washed, dried, and placed in a sealed German glass tube, slightly contracted in the middle part. The end of the tube was heated to dull redness for about ten minutes by means of a lamp. When allowed to cool, a very small ring was found at some distance from the heated end; upon again heating the sublimate, it was driven to another portion of the tube. When examined by Dr. Halley under the microscope, he found it to consist of numerous distinct octahedral crystal. The author admitted that the contents of the tube should be subjected to further investigation before it could be affirmed that arsenic was present. Some further experiments were described which were instituted to ascertain if the arsenic had been derived from some other source than the paper. Common air was drawn from the garden attached to Dr. Halley's house through a solution of ammonio-nitrate of silver, by means of an aspirator, for twelve hours. No arsenic was detected. A stream of coal gas was passed for ten hours through the test solution, but no trace of arsenic obtained. Common air was drawn, first through a box containing several yards of the paper used in papering the room, and then through the test solutions for seven days, but no arsenic was found. The products of combustion of the gas were then drawn through a box containing the paper and through the test solution. The result of this experiment was a small trace of arsenic, to which, however, no further test was applied than in the first case.

In the course of the discussion which ensued, it was stated by Mr. Williams that

he believed the flock upon the paper to be coloured with an arsenical green, although he had not submitted it to careful examination.

At the following meeting (December 6, 1858), Mr. C. H. Wood said that, in consequence of the statement made by Mr. Williams at the previous meeting—namely, that he believed the green flock used in paper-hangings to be coloured with an arsenical pigment, he had obtained different samples of the flock from several large makers of paper-hangings ; these he had carefully examined, but could not find a trace of arsenic. He had also obtained a number of different papers containing a large quantity of green flock upon their surface, but which yielded no evidence of the presence of arsenic. Moreover, he had very carefully separated some of the flock from the paper exhibited by Mr. Williams, and found it to contain no arsenic, although the groundwork of the paper was coloured with arsenite of copper. He said he was unable to ascertain the exact process adopted for the coloration of flock, as its manufacture was at the present time almost exclusively carried on in France, but there could be little doubt that it was dyed in a similar manner to green cloth.

"On the different Methods of Bleaching Olive Oil and the Effects of such Operations on the Properties of the Oil when used in Pharmacy." Mr. S. Gale. Dec. 6, 1858.

The Author described three processes—first, filtration through fuller's earth; the earth being made into a paste with oil, and then the bulk of oil to be filtered added. Second, mixing the oil with animal charcoal and exposing it to light. Third, filtration through a bed of animal charcoal. He stated that the first process yielded an oil perfectly free from colour, but resembling very much nut oil in smell and taste. The second produced a white oil, which, he was informed, rapidly became rancid. The third process yielded a very nice oil, and one which he considered would bear inspection. Specimens of oil prepared by these processes, together with a specimen of the same oil in an unbleached state, were put into partially closed bottles to be kept for some time, with the view of ascertaining the effect upon them of exposure to the air. The results to be reported to a future meeting.

"On the Detection of the Fixed Alkalies in the Presence of each other." December 6, 1858.

The Secretary exhibited a new method of detecting the fixed alkalies in the presence of each other by the colour they impart to flame, which had been recently published by Mr. Cartmel.

"On the Presence of Arsenic in Green Tapers." By Mr. Barnes. Jan. 10, 1859.

Mr. Barnes had had his attention directed to this subject by a gentleman who stated that upon blowing out a green wax taper he perceived an alliaceous odour. Upon examination, the green colour was found in every case to be produced with an arsenite of copper.

"On a New Form of Arsenic Reduction Tube." January 10, 1859.

The Secretary exhibited and explained a modification of the apparatus used for the reduction of arsenic in testing which had been recently introduced by Dr. Guy.

"On the Adulteration of Lozenges." Mr. J. Robbins. February 7, 1859.

The Author gave the results of the examination of twenty samples of various kinds of lozenges. All the specimens of boiled sugar confectionary which he examined were unadulterated. Of eight specimens of peppermints, one contained fifteen per cent. of sulphate of lime with twelve of starch, and two contained five per cent. of starch; the rest were genuine. Two specimens of hundreds-and-thousands, both contained large quantities of sulphate of lime and starch. Of four samples of comfits, two contained twenty-seven per cent. of flour, the remaining two were genuine. Of the whole twenty samples, only ten were adulterated, and most of the samples were obtained in the lowest localities in London, and at a very small price.

"On Citrate of Iron and Quinine." Mr. J. Schweitzer. Feb. 7, 1859.

The Author gave the results of the examination of three specimens of this preparation obtained from different makers of repute. He found them all to contain

ammonia, and No. 3 a considerable quantity of potash. No. 1 was stated by the manufacturer to be made with magnetic oxide of iron, and all the specimens appeared to contain a portion of the iron in the state of protoxide. The proportion of quinine present varied, but as he had been unable to meet with any analysis or statement of the composition of citrate of quinine, he could not ascertain whether these preparations contained the proper amount of citrate of quinine or not. He thought it very desirable that the amount of quina intended to be present should be indicated rather than the per-centage of citrate of quinine. The quina from No. 3 furnished salts which were uncrystallizable. He also examined a fourth specimen professedly made with amorphous quinine.

In the discussion which ensued, Mr. BRAITHWAITE said that he was engaged in some experiments for the purpose of ascertaining the method by which this preparation is obtained of the peculiar golden-yellow colour which it always possesses, as met with in commerce. When prepared by the processes usually indicated, by dissolving three parts of percitrate of iron, and one part of citrate of quinine in water, evaporating and scaling, the product always possessed a pale-red colour.

He considered the effect was due to the reduction of a part of the peroxide of iron to the state of protoxide. He found that recently precipitated and moist magnetic oxide was freely soluble in citric acid, and yielded a citrate which scaled well, and possessed the peculiar colour. It was, however, darker than the commercial specimens. The addition of a small quantity of potash to the solution of percitrate—not sufficient to neutralize the acid—also produced the desired effect, and was, he believed, the method generally adopted.

"On Ozone and Antozone." March 7, 1859.

The SECRETARY brought before the meeting the recent experiments and views of Schonbein on this subject.

"A Description of the late Mr. Lindsey Blyth's Patent Process for the Preparation of Sewage Manure." By Mr. W. T. Fewtrell. April 4, 1859.

Mr. Blyth's process he described as consisting in the employment of a soluble or superphosphate of magnesia to be added to the sewage, and then precipitated with lime, when an insoluble triple phosphate of Mg O and NH_4 O is thrown down. The superphosphate of magnesia is prepared by treating phosphate of lime with oil of vitriol and adding sulphate of magnesia; powdered charcoal is afterwards added to bring it to the solid form.

"On Sal Volatile." By Mr. J. Schweitzer. April 4, 1859.

The Author recommended that in the preparation of sal volatile the aromatics should be distilled with the spirit, and an aqueous solution of the carbonate of ammonia afterwards added to the distillate.

"On the Solubility or Miscibility of Chloroform and Chloric Ether in Water." Mr. A. F. Haselden. May 2, and July 4, 1859.

The results of these papers were afterwards given to a Pharmaceutical Meeting, and published in the *Pharmaceutical Journal.*

"On a Magnetic Peroxide of Iron." By Mr. Robbins. June 6, 1859.

The Author stated that when ordinary magnetic oxide of iron is heated up to a certain point, it glows, and apparently enters into combustion; upon cooling, it presents the red colour and general appearance of sesquioxide of iron, but is still strongly attracted by the magnet. By dissolving it in hydrochloric acid, adding acetate of potash, and then ferridcyanide of potassium, no evidence of the presence of any protoxide could be obtained. The Author therefore concluded that it was true peroxide of iron, but which retained the magnetic properties of the body from which it was produced.

In the discussion which ensued, the PRESIDENT said he considered that Mr. Robbins had not adduced sufficient evidence that the body under notice consisted entirely of peroxide of iron. He did not attach much importance to the glowing, as sesquioxide itself presented the same phenomenon when heated, and which appeared to be due to some molecular change, and not to any alteration in its composition. Neither did he think the red colour anything, as ordinary magnetic oxide sometimes possessed a

similar colour. With regard to the test applied by Mr. Robbins, he considered that it only indicated the absence of protoxide in the hydrochloric acid solution, but that during the process of dissolving the oxide, which would have become more difficultly soluble by being calcined, the proto might become converted into a per salt. He thought it would be necessary, in order to satisfactorily settle the point, to ascertain the proportion of iron and oxygen in the compound, or, by dissolving it in aqua regia and precipitating by ammonia, ascertain if any increase of weight took place.

"Some further Evidence in Support of the Existence of a Peroxide of Iron capable of being Attracted by the Magnet." By Mr. Robbins. July 4, 1859.

The Author stated that he had made the experiment referred to by the President on a previous occasion, but the result was confirmatory of the view which he had expressed—namely, that the compound consisted entirely of peroxide of iron. He also stated that when magnetic oxide of iron is fused with nitre, the oxide still retains its magnetic properties.

"On Weights and Measures." June 6, 1859.

The PRESIDENT brought the subject of weights and measures before the meeting, with a view to its discussion relative to the change proposed to be effected in the weights used in medicine by the Pharmacopœia Committee of the Medical Council.

"On the Solubility of Mercurial Precipitates in Alkaline Salts." Mr. J. Attfield. Nov. 7, 1859.

The object of the Author was to draw more prominent attention to the solvent action which the alkalies and their salts exercise on the insoluble compounds of mercury. He showed that the mercuric and mercurous amido compounds are soluble to a considerable extent in the ammoniacal salts, and that the presence of much nitrate of ammonia, for instance, may, under particular circumstances, entirely prevent the precipitation of the mercury by the ammonia. The fixed alkalies and their salts were also shown to have the same action, but in the case of the mercuric compounds, to a much smaller extent; with the mercurous salts, the result is, in most cases, accompanied by decomposition and separation of metallic mercury.

"On Glycerole of Aloes." By Mr. A. F. Haselden. Nov. 7, 1859.

The subject of this communication has since appeared in the *Pharmaceutical Journal.*

"On the Phosphates of Iron and their Syrups." By Mr. S. Gale. Dec. 5, 1859.

This subject is still under investigation.

The Treasurer's Report was read, and showed a balance due of 6s.

It was resolved, "That the Report of the Committee be received and adopted."

The following are the officers for 1860:—*President*, T. Redwood, Ph.D.; *Treasurer*, S. Gale, 338, Oxford Street; *Secretary*, C. H. Wood, 17, Bloomsbury Square; *Committee*, J. Attfield, J. B. Barnes, J. Barnard, J. T. Fewtrell, J. Ince, A. F. Haselden, J. Schweitzer.

Meetings of the Association will be held on the first Monday in the months of February, March, April, May, June, July, November, and December. To commence at half-past Eight.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE Seventh Meeting of the Session was held in the Royal Institution, Colquitt Street, Dec. 22, 1859;

THE PRESIDENT IN THE CHAIR.

Messrs. I. B. Cooke and S. Gill were elected Members of the Association.

After some donations had been announced by the Secretary, Mr. ABRAHAM proceeded to read a paper communicated by Mr. J. Glover, "On the Manufacture of

Bicarbonate of Soda." Mr. Glover entered minutely into the processes adopted by the large manufacturer, more particularly that in which the crystals of carbonate of soda are placed in an atmosphere of carbonic acid, until the whole have been converted into the bicarbonate. He then entered into some critical observations in reference to the best processes, economically and commercially considered, and also that by which the greatest purity might be obtained. The paper was illustrated by some excellent drawings of the apparatus employed, and diagrams of the chemical changes involved in the manufacture.

Dr. Edwards exhibited some beautiful electric phenomena, in which the audience was much interested.

A vote of thanks to Mr. Glover and Dr. Edwards having been carried, the meeting broke up.

Royal Institution.

The Eighth Meeting was held January 19, 1860;

THE PRESIDENT IN THE CHAIR.

The following donations were announced :—One part of Dr. Muspratt's *Chemistry*, from Mr. Wright ; *The Chemist and Druggist*, from the Proprietor ; Podophyllin, from Dr. D. P. Thomson ; Ternitrate and Trisnitrate of Bismuth, from Messrs. Higgins and Cattle ; Kahinça Root *(Chiococca racemosa)*, from Mr. J. Shaw.

In presenting the trisnitrate of bismuth, Dr. Edwards remarked that if that article was manufactured from the crystalline nitrate there would be no danger from any accidental admixture of arsenic. He did not believe that arsenic existed in the salts of bismuth to the extent stated, as he had made careful analyses of several specimens of the trisnitrate, and had not found a trace of arsenic. Reports of an exaggerated nature had also been circulated to the effect that arsenic had been found in various salts, and that the arsenious acid had been absorbed by plants and afterwards assimilated by animals which fed upon them. This he much doubted. The source of the arsenic was supposed to be in the sulphuric acid which is now largely used for dissolving bones in the manufacture of artificial manures.

In a short discussion which ensued, Professor Archer thought that the chemists engaged in medico-legal investigations would do well to follow the example of the American chemists, by always publishing the process by which they proved the purity of the various chemicals used as tests in the analysis for the detection of poison.

Mr. Evans, on behalf Mr. Outram, begged to explain that the experiments which he had detailed at a previous meeting, although made in Professor Calvert's laboratory, were not given upon his authority, and he regretted that any misunderstanding had arisen in Professor Calvert's mind upon the subject.

The President stated that he had received a communication to the same effect from Mr. Calvert, which it would not be necessary to read after the explanation given by Mr. Outram.

Professor Archer then read a paper on the useful products of the orders Quadrumana, Cheiroptera, and Insectivora, which was illustrated by various specimens from the museum of the Royal Institution. The order Quadrumana or monkey tribe, first engaged attention, Professor Archer explaining in a very lucid manner the natural history and the peculiarities incident to each family of this order, and the economic uses to which they are applied, the skins of a great number forming valuable furs, of which muffs, &c., are made, and also mantles for chiefs in some of the islands of the Indian Ocean and elsewhere. Several species of this order are used by the natives as food, some of which are considered delicate and agreeable ; and even some Europeans, including the illustrious Humboldt, have pronounced them excellent eating. The Cheiroptera was next noticed, the common bat forming the type of the order ; after which the order Insectivora, which is represented by the hedgehog and the common mole, was briefly alluded to. The paper throughout was instructive, and the description of the history and habits of the various animals brought under review proved highly interesting to the audience.

A cordial vote of thanks to Professor Archer terminated the proceedings.

ORIGINAL AND EXTRACTED ARTICLES.

ON SYRUPUS FERRI IODIDI.

BY MR. EDWARD SMITH.

From the last number of the Journal I find that Messrs. T. and H. Smith take exception to my remark on Syrupus Ferri Iodidi, that "deficiency in colour beyond a certain point would seem to indicate deficiency in strength," and produce a sample of colourless syrup of P. L. strength to show that "colour has nothing whatever to do with strength."

But they proceed to say that "were such an indicator believed in, manufacturers inclined to be dishonest would simply have to expose their weak syrups to the action of the air to obtain a sufficient depth of colour to indicate strength!"

Now, if Messrs. Smith will again carefully read the whole of the original paragraph (page 273), they will find from the context that the colour, the deficiency of which is inferred to indicate deficiency in strength, is the *green* or *yellowish green*—consequently, the only logical conclusion to be drawn from their remarks is, that weak syrups become green by exposure to the air. But they do not; they become *brown*, as every Pharmaceutist knows. The green is the natural colour of solutions of proto-iodide of iron of the strength ordered in the Pharmacopœia (see Phillips), and the brown is caused by the decomposition of the iodide when left in contact with the air, sesquioxide of iron and free iodine being produced—hence the *brown* colour; and thus, if a dishonest maker *did expose* his weak preparation to the air, it must be patent to the most incipient mind that he would simply spoil his syrup, by causing it to acquire an appearance which would render it quite unfit for sale and use.

Solutions of proto-iodide of iron, unless highly dilute, are green (see Brande, Fownes &c., &c.), and I have yet to learn that the addition of sugar deprives them of this colour (as a diluent it may, and undoubtedly does, lessen its intensity); and I certainly think it quite unnecessary that any extraneous means should be employed to produce such an effect, but fully concur with the remarks made by Mr. Daniel Hanbury (page 354), "that a perfect syrup has a slight tinge of green; and I believe, too, that the compilers of the Pharmacopœia intended that it should be so, since they direct the iodine and iron to be boiled with water "until the solution assumes a *greenish* colour."

In conclusion: a colourless preparation does not seem to possess any advantage over one of a natural colour, and undoubtedly has the disadvantage of not being readily distinguished, by the eye, from one which may be of inferior strength.

94, *St. John Street Road, Dec.* 19*th*, 1859.

CHLORINE IN BASIC-NITRATE OF BISMUTH.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Observing in last month's Journal a note touching on the above subject, which produced some discussion at the December meeting, I beg, without trespassing long upon your valuable space, to add a few addenda to the remarks already elicited.

In two samples of the so-called trisnitrate of bismuth, chlorine was found in considerable quantities, amounting in one case to 72.5 per cent. It seems to have been attributed by the analyst to the circumstance of its being prepared with hydrochloric acid, whilst in the resulting discussion it was ascribed to intentional or accidental substitution of the oxychloride. This seemed

to create some surprise, as the substitutions were not considered economical, but I believe it is the *amor nummi* which induces the sophistication.

When prepared by similar processes to those of the Pharmacopœias (for the excellent one given by Mr. Huskisson would never be followed out by the manufacturer), we seldom succeed in getting more than 73 per cent. of basic-nitrate, however careful we may be in having our solution as neutral as possible, and as regards washing, &c., viewing the decomposition as follows :—

$4\,(Bi\,O_3\,3\,NO_5) + 6\,HO = (Bi\,O_3\,3\,NO_5,\,2\,Bi\,O_3) + (Bi\,O_3\,3\,NO_5) + 6\,HO,\,NO_5)$

One equivalent of ternitrate remains in solution.

It is our object, if possible, to save the bismuth remaining in solution. This is done by the manufacturer, I believe in most cases, in the following manner:— On the addition of water the deposit of basic-nitrate is allowed to subside, and the supernatant liquor is decanted off; to this a solution of chloride of sodium is added as long as there is a decomposition ; the resulting oxychloride is mixed with the original precipitate, and by this means 40.5 per cent. more is got.

This practice, which I believe to be pretty general, will account for the presence of chlorine in the samples analyzed, but will not affect the amount of arsenic contained in the product either way. Oxychloride is easily determined from basic-nitrate by the microscope.

Having myself had occasion to examine three specimens from different sources (in two of which I found chlorine), I have come to the conclusion that they generally contain but a very minute trace of arsenic, which in connexion with the small doses in which bismuth is exhibited renders the subject not worth consideration.

Yours truly,
CHAS. R. C. TICHBORNE.

MEDICINAL PROPERTIES OF *GLOBULARIA ALYPUM*, L.

THE purgative properties of the leaves of this plant have lately been brought before the medical profession by Dr. Gustave Planchon, of Montpellier.

Dr. Planchon, in an essay entitled *Des Globulaires au point de vue botanique et médical*,* discusses, in the first place, the botanical affinities of the genus *Globularia*, which, after careful revision, he concurs with Dr. Lindley in placing in the natural order *Selaginaceæ*. The second part of his pamphlet relates entirely to one species of *Globularia*, namely, *G. Alypum*, L., a small shrub of the south of Europe, well known to the botanists and physicians of the sixteenth and seventeenth centuries, who generally regarded it as a drastic purgative. Dr. Planchon shows that these ideas of the powerfully cathartic properties of the *Globularia* are very much exaggerated, and that in fact its leaves are a safe, mild, and efficient purgative. The form in which the medicine is best exhibited is a decoction, made by boiling an ounce of the leaves in water for ten minutes. This quantity constitutes one dose. Dr. Planchon has arranged his observations on twenty-two cases in a tabular form, from which we gather that the decoction administered in the dose named usually acts in about two hours, producing on an average four evacuations. Neither vomiting nor nausea are felt after a dose, nor does its action produce griping. In fact, it purges very gently, without occasioning any unpleasant symptoms. Another advantage which it possesses, and which Dr. P. very justly points out as remarkable, is that of not occasioning any subsequent constipation—a fact noticed in every case recorded. It may be employed, says he, in all cases in which a purgative effect is required without irritation of the intestinal canal. In its bitter properties it approaches that class of purgatives

* Montpellier, 1859. 8vo, pp. 59.

which, taken in small doses, exercise on the digestive organs a simply tonic action. It fulfils the same indications as rhubarb, but with the advantage of purging more mildly, and of not producing the ulterior constipation which is one of the commonest inconveniences of that medicine.*

CULTIVATION OF MEDICINAL PLANTS AT HITCHIN, HERTS.

(*Continued from page* 325.)

3. HENBANE.

It is now well known that there are in common cultivation two varieties of henbane (*Hyoscyamus niger*, Linn.), one of which is biennial (*Hyoscyamus niger*, var. *a. biennis*), and the other annual (*Hyoscyamus niger*, var. *β. annua*, or *Hyoscyamus agrestis* of some authors). The biennial variety only is cultivated by Mr. Ransom at Hitchin, and for it, on an average of some years, he reserves from three to four acres of land. This variety is commonly distinguished under the name of biennial black henbane. The two varieties have been already fully described in this Journal by Dr. Pereira, Messrs. Houlton, Squire, and others, and need not, therefore, be further alluded to here.†

The biennial black henbane is that which is commonly regarded (and, as we believe, correctly so) as the more active variety, and it is therefore directed to be employed in the London Pharmacopœia. The wild plant is also usually stated to be more powerful in its action than that which is cultivated, but we have no very satisfactory evidence which is demonstrative of its superiority, indeed, Dr. Christison states, that "from experiments made some years ago at the Royal Infirmary in Edinburgh, the inferiority of cultivated plants, if it exists at all, seems not appreciable in practice." There is probably, therefore, but very little difference in the medicinal activity of the cultivated and wild henbane. It is satisfactory to find that such is the fact, as henbane is now employed far too extensively for our supplies to be derived solely from wild plants; indigenous henbane being now by no means abundant, and becoming less so every year, such a source of supply would soon be exhausted. Hence, nearly all the henbane used in this country is derived from plants cultivated in different districts; more especially at Mitcham, Hitchin, and in certain parts of Bedfordshire and Cambridgeshire. In some districts, the annual variety is much cultivated, and one of the reasons for this is said to be its greener and more pleasing colour.

At Hitchin the biennial black henbane is raised from seed. This is, we believe, the only way in which it can be successfully reared. Before sowing, the ground is well trenched and manured. About the middle or end of March, or early in April, according as the season is favourable or otherwise, the seeds are sown in rows, which are placed at about eighteen inches or two feet apart. The young plants generally begin to show above ground about the end of May or in the first or second week of June, although if the spring be very cold or otherwise unfavourable to the process of germination, they do not make their appearance till even a later period. Indeed, we are informed that it not unfrequently happens, that after all the labour and care which has been bestowed by the herb-grower in the selection of his seed, and in preparing the ground for its reception, &c., that the plants fail to spring up altogether. We believe that of all medicinal plants cultivated by the herb-grower, henbane is the most uncertain one he has to deal with, for besides the frequent failure, as just noticed, in the germination of the seeds, the plants, should they make their appearance above ground, are very liable to be destroyed at an early age by insects, &c., and even should they escape their ravages, and vegetation actively commence, if the weather should then become very dry, the yet young and

* A paper on the leaves of *Globularia Alypum*, under the name of *Wild Senna*, from the pen of Dr. Carl Martius, appeared in vol. xvi., p. 426, of this Journal.

† See vol. i., pp. 406 and 427; vol. ii., p. 122; vol. x., pp. 236 and 439, &c.

tender shoots become soon checked in their growth, and the plants are sometimes entirely dried up, and the crop consequently lost, and more particularly so as from the very slow progress which the plants under such adverse circumstances make, they are more subject to injury from the ravages of insects and snails, the latter of which especially, devour the young leaves with great eagerness and with perfect impunity.

If the season be favourable to the growth of the plants, as soon as they get well established they progress rapidly, and about the beginning of August especially, the leaves, which are then becoming large, make such progress that they sometimes measure ultimately two feet, or more, in length. The leaves thus produced in the first year's growth are all stalked, and proceed from the stem under ground; hence, they are termed radical. No aërial stem is produced during the first year. About the middle of August the leaves are cut, and immediately placed in the drying-room, and dried gradually by the aid of steam-heat. According to Mr. Ransom, these first year's leaves form the staple of what is commonly sold as *folia hyoscyami*. After the removal of the leaves, nothing further is done to the henbane crop during the first year except that the ground in which it is raised is frequently hoed, in order to prevent the growth of weeds, &c. about the plants, and to loosen the earth about their roots, &c. The plants continue to grow vigorously throughout August and in the early part of September, by which new leaves are soon produced to replace those cut away. After the beginning of September, vegetation begins to decline, but they remain growing slowly until October, and then the first frost which comes causes them to wither away, and, in November, all trace of them above ground is lost. The root, however, being biennial, survives during the winter, but remains comparatively dormant till about the following May, when it begins to develop an aërial stem with leaves on its surface. Should the newly developing parts be then exposed to favourable weather, and succeed in escaping the ravages of snails, &c., they grow very rapidly, so that towards the end of May, or beginning of June, the plants sometimes reach the height of four or five feet, but their more usual height is about three feet. The flowering takes place, generally, early in June, and continues throughout the month, as also in July. As soon as the fruit is matured, and the seeds ripened, the plants die.

When the henbane plants are fully in flower the gathering of the crop commences, and continues throughout June and the early part of July. It is usual to reserve some of the plants for the leaves, &c., the remainder being employed in the preparation of extract. Thus, the former have their mature leaves stripped from the plant while growing in the field; these are brought home to the laboratory as speedily as possible, and dried by steam-heat in a room adapted for the purpose; these form the true biennial *folia hyoscyami*. Mr. Ransom thinks that they alone should be used in medicine, as they possess much more medicinal activity than those obtained from the same plants in the first year of their growth. He also states that the leaves when gathered at this stage of the life of the plant have a very powerful odour, which differs from and is less unpleasant than that given off by them at any other period of their existence. Some of the flowers are also generally plucked and dried with the leaves. We believe this to be a mistake, for we have no doubt but that they are much inferior in activity to them; indeed, this would appear to be the opinion of Mr. Ransom also, as he states that he does not consider it desirable to mix many flowers with the leaves. From the same plants several gatherings of leaves take place during the season, and when their collection has terminated, the plants from which they have been obtained are left standing in the field, and from them the seed is derived which is reserved for sale and for sowing the next year. The remaining plants are employed for the preparation of the extract of henbane, and for this purpose it is considered very desirable to use the herb as soon as possible after it has been cut, for if it be allowed to remain in heaps for even a short time, it heats, and then the after product is always more or less injured. We regard this plan of operation as

very important, and especial attention should be always paid to it, and more particularly so from the circumstance of henbane being thus employed in the preparation of extract, &c., at commonly a very hot season of the year. Mr. Ransom informs us that the whole time occupied from the growing of the plants in the field to their conversion into extract is only, as a rule, from twelve to sixteen hours.

The produce of henbane per acre varies very much according to the season, for while the quantity in some years is not more than a ton, in others, it is as much as five tons, or even in rare cases, still greater. The produce of extract per cwt., also, is very variable; according to Mr. Ransom's experience at Hitchin, it is from four pounds to seven pounds and a half.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On Platinum and the Metals with which it is associated.—M. St. Claire Deville, in conjunction with M. Debray, has been engaged for a length of time in studying the groups of metals which constitutes native platinum, and the results of his researches, while they are calculated to effect an entire change in the methods of extracting platinum from its ores and to extend and facilitate its application to the arts, at the same time form a most valuable addition to our knowledge of the properties and characters of this natural group of elementary substances. The memoir of M. Deville, which has been recently published,* is divided into two principal parts; the first, treating of the individual metals of the group, their modes of preparation, characters, and properties, in a purely scientific point of view; and the second, of the processes of metallurgy, methods of assay, and means of utilizing the hitherto waste products by the formation of valuable and useful alloys, which have been devised by the authors, and patented both in France and this country.

The metallurgy of platinum, although a comparatively modern art, is one which has received but little attention from chemists, and the metals which are found associated with the platinum in nature have been but imperfectly studied, receiving no practical application, and accumulating in the hands of the manufacturer as waste products. The new metallurgical processes proposed by the authors, are entirely dry methods, and depend upon fusion at extremely high temperatures. They include methods for the revivification of pure platinum—manufacture of pure platinum—the extraction from the crude mineral of a triple alloy of platinum, rhodium, and iridium having a constant and suitable composition—and the utilization of the residues for the same purpose.

The first part of the paper, which treats systematically of all the metals in the platinum group, will be now noticed; the second part, forming the technical division of the subject, including the methods of assay, &c., and which is to some extent based on the first, will be noticed in our next number.

Osmium.—This substance has been hitherto prepared only in a state resembling pyrophoric iron, or amorphous silicon and boron. Osmium is regarded by the authors as a metalloid, and, like a certain number of the non-metallic bodies, it possesses the power of entirely changing its chemical and physical characters according to the manner in which it is prepared. Ordinary osmium, obtained by the process of Berzelius, is a semi-metallic, spongy mass, which exhales a very sensible odour of osmic acid, indicating that it is acted on by oxygen at ordinary temperatures. Its density is then 7. If obtained by reducing osmic acid with hydrogen, it is metallic, and has a sp. gr. of about 10. It may, however, be obtained in the pulverulent state, possessing totally different characters to the above, by the following process:—One part of osmide of iridium, in fine powder—(if not naturally pulverulent, it should be chemically divided by a process to be described further on under ruthenium)—is mixed with $5\frac{1}{2}$ times its weight of peroxide of barium, which should be carefully weighed, in order that it may be afterwards precipitated by a known weight of sulphuric acid. This mixture, rendered as intimate as possible by prolonged trituration in a porcelain mortar, is heated for one or two hours to the fusing

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* *Annales de Chimie et de Physique* for August, 1859.

point of silver in an earthen crucible, closed by a lid luted down with fire-clay. A black homogeneous mass is thus obtained, which is then coarsely powdered, and introduced into a glass-stoppered retort; first a little water, and then 8 parts of hydrochloric acid mixed with 1 part of ordinary nitric acid, are added, and the whole distilled, the receiver being carefully cooled, in order to avoid the loss of osmic vapour. The operation is finished when the vapours at the tubulure of the retort present no odour of osmic acid. The condensed product is then submitted to a second distillation, and the distillate received into dilute ammonia. The osmiate of ammonia is then supersaturated with sulphuretted hydrogen, boiled for some time and filtered. The filter must not be dried at an elevated temperature, as the sulphide of osmium is apt to take fire. The sulphide is introduced into a gas carbon crucible, well smoothed in the interior, and furnished with a close-fitting cover; the carbon crucible is then enclosed in an earthen one, the space between being filled with sand, and the whole heated for four or five hours to a temperature equal to the fusing point of nickel. The sulphide of osmium is reduced by the heat, and the metal obtained of a blue colour, more brilliant than zinc, in small fragments, very readily divided. It may be obtained more dense and metallic by again heating it to a temperature at which rhodium fuses, in an apparatus which will be described further on. Thus obtained osmium has a density equal, and even superior, to that of platinum, ranging from 21.3 to 21.4. It is without odour, and may be heated to the fusing point of zinc, without furnishing any vapours of osmic acid—above that temperature it is combustible. Osmium may be crystallized by heating it to bright redness with 7 or 8 times its weight of tin in a carbon crucible, and allowing the mass to cool slowly; the osmium crystallizes out, and may be separated by dissolving the tin in hydrochloric acid. If this metal be fused with zinc, and the zinc volatilized by the application of the intense heat previously referred to, the osmium is obtained in a compact state, filled with irregular cavities, but presenting no evidence of its having been fused. In fact, the most powerful means that can be employed fail to effect the complete fusion of this metal; although, when heated in a powerful oxy-hydrogen flame, a portion burns as osmic acid, and a portion is volatilized and condensed in the form of soot on a cold body presented for the purpose.

The authors prepared anhydrous osmic acid by the process of Berzelius, which consists in roasting pure osmium in a current of oxygen gas, and determined its vapour density, which they found to be 8.9; the calculated density is 9. Osmic acid, $OsO_4 = 131.5$, therefore represents two volumes of vapour.

The apparatus which has been referred to, and which was employed by the authors for the production of the maximum temperature, in their attempts to effect the fusion of osmium, the most intractible and infusible metal of the group, is represented in fig. 1. It is composed of three parts: an oxy-hydrogen blowpipe, E E; a furnace constructed of quick lime, A B D; and a crucible, G H I. The blowpipe consists of a copper cylinder, EE, twelve millimetres in diameter, the lower part which enters the furnace being slightly conical and made of platinum. A tube of copper, C C C, of three to four millimetres internal diameter, which is terminated by a platinum nozzle, passes through the cylinder E E, and may be maintained at any height it is thought proper, by

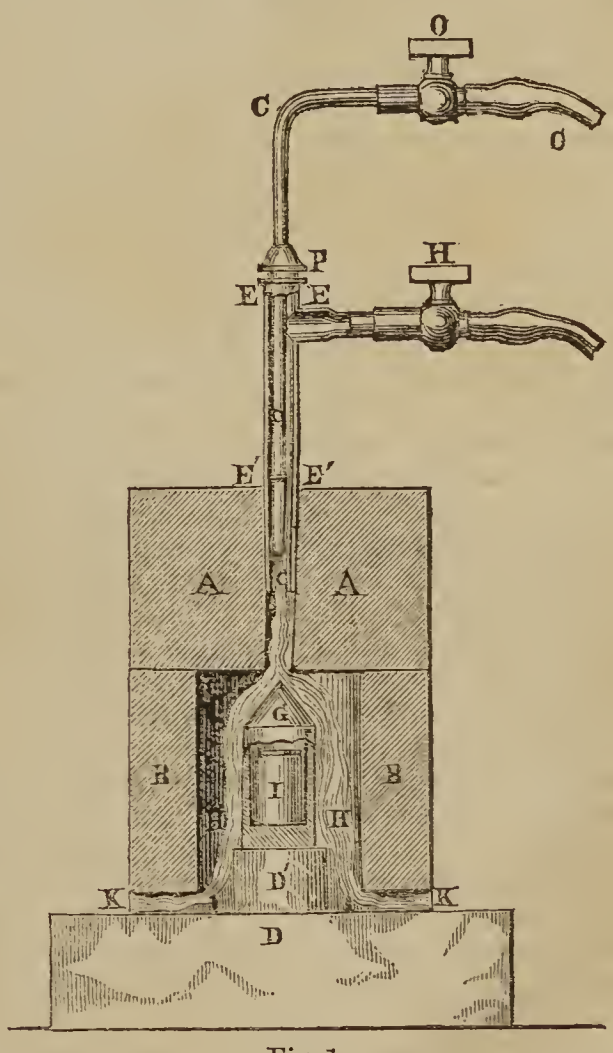

Fig. 1.

means of the stuffing box or pressure screw, P. The opening in the platinum nozzle of C should be about two millimetres and a half in diameter, and the taps O and H should be as large in their opening as possible. The hydrogen or coal gas is admitted by the lower tap H, and the oxygen by O.

The furnace consists of three separate cylinders, which are all made of well burnt, slightly hydraulic, lime, sufficiently compact to be worked. No advantage is gained, however, by its being very hard, because then it is not easily cut. The first cylinder, A A, is pierced by a slightly conical opening, in which the end of the blowpipe cylinder. The second, accurately fits B B, is of such an internal dimension, that it leaves a space of three or four millimetres between its walls and the crucible. The third cylinder, D, upon which the second stands, is traversed by four deep grooves, K K, at right angles to each other, by which the burning gases escape.

The inner crucible I is made of gas carbon, and contains the substance to be heated. The outer case, H H, is composed of lime, and is surmounted by a circular cone, G, the summit of which should be in a vertical line from the platinum nozzle C. All the cylinders of the furnace should be strongly encircled by bands of iron, as the lime usually cracks during the heating. In using the apparatus, the crucibles are placed on the base D, the second cylinder, B B, adjusted in its place, the piece A raised, with the blowpipe attached, the tap H partly opened, and the gas lighted, a little oxygen being at the same time applied, but in such a manner as to leave the combustible gas in excess. The *flame is then introduced* into the furnace, and the whole arranged as in the drawing, the oxygen tube being adjusted to its proper position, so as to attain the maximum temperature, by means of the screw P. In about ten minutes the crucible is heated to its centre to the fusing point of rhodium. The oxygen should be used at a pressure of three or four centimetres of mercury.

Ruthenium.—This, after osmium, is the most refractory of all the metals, and can only be fused in small quantities by the maximum heat of the blowpipe. It is hard and brittle, like iridium. Its most distinctive character is its density, which varies from 11 to 11.4. It may be prepared as follows :—The crude osmides are powdered by alloying with zinc, which is then volatilized away in a carbon crucible. A porous friable mass is thus obtained, which may be easily rubbed to powder, A mixture of one part of this finely powdered substance, three parts of peroxide of barium, and one part of nitrate of baryta is carefully made, introduced into an earthen crucible, and heated to redness (a little below the fusing point of silver) for an hour. The black friable mass resulting is very carefully introduced, in small portions at a time, into a stoppered bottle containing twenty parts of water and ten parts of ordinary muriatic acid, and standing in a vessel of cold water. When the reaction has terminated, one part of nitric acid is added, then two parts of oil of vitriol, and the bottle well shaken. The sulphate of baryta is allowed to deposit, the supernatant liquor poured off, and the precipitate washed with some water. The clear liquid is then distilled — (the distillate is rich in osmium, which may be precipitated by ammonia and sulphide of ammonium). To the red liquid remaining in the retort some sal ammoniac and a little nitric acid is added, and the whole evaporated to dryness by the heat of a water-bath. The bluish-black crystalline precipitate so obtained is washed with a dilute solution of sal ammoniac, and the black salt remaining (chlorirdate of ammonia, containing the ruthenium) is calcined in a porcelain crucible, by which a mixture of iridium and ruthenium is obtained. This is fused in a silver crucible with one part of potassa fusa and two parts of nitre for an hour, the resulting salt dissolved in cold water, filtered through asbestos, and treated with carbonic acid or nitric acid. A precipitate of oxide of ruthenium is deposited, which is then strongly calcined in a gas-carbon crucible and fused with several precautions, in a hollow scooped out of a piece of lime, by the mixed gas blowpipe. If the ruthenium contains any osmium or silicon, these impurities are separated in vapour or in combination with lime. To obtain the metal perfectly pure, the fusion with nitre and potash should be repeated several times, until the density of the ruthenium is about 11.3. The authors consider its specific gravity to be the most distinctive characteristic of this metal, and the best criterion of its purity. It is necessary to have recourse to this means of verification, because the mixture of potash and saltpetre is capable of dissolving other substances, particularly iridium, which may contaminate the product, but which, by its much greater density, would be thus detected. They remark that all the coloured reactions of ruthenium belong almost without exception to iridium.

M. Fremy has described an easy means of obtaining crystallized oxide of ruthe-

nium, by a process of roasting similar to the one for osmic acid, but which meets with different success, dependent to some extent upon the proportion of ruthenium present in the crude substance. If this proportion is sufficiently large the process may be advantageously adopted. The roasting is facilitated by fusing the osmides with seven or eight parts of zinc, dissolving the excess of zinc by hydrochloric acid, calcining the powder to dull redness in a closed crucible, and, lastly, effecting the roasting at a temperature equal to the fusing point of copper, on platinum foil or in a porcelain tube. Fine prismatic crystals may be so obtained. Ruthenium forms crystallizable alloys with zinc and tin. The latter has the formula $Ru\,Sn_2$. It is obtained with the greatest facility by heating the ruthenium with ten or fifteen parts of zinc in a carbon crucible to redness, and afterwards acting on the fused mass with hydrochloric acid. A magnificent geode of cubical crystals remains.

Palladium.—This is the most fusible of all the metals of this group. The furnace employed for fusing platinum liquefies this metal with the utmost facility. When submitted, by means of the mixed gas blowpipe, to the temperature at which iridium fuses, it is converted into a green vapour, which condenses as a bistre-coloured powder, consisting of a mixture of metal and oxide.* This metal, liquefied in contact with the air, presents the same phenomenon as silver, it dissolves gaseous oxygen, which is again liberated at the moment of its solidification. But the oxygen is only disengaged when a crust of congealed metal has formed ; therefore the resulting mass is filled with cavities, although the surface is perfectly regular. Palladium closely resembles silver, but is more oxidizable at low temperatures, and its surface is always tarnished by a thin film of oxide. If a plate of palladium be heated in the flame of a lamp in which the gas is mixed with air and burnt on wire gauze, the flame then extinguished, and, after a few seconds, while the metallic plate is still warm, the gas be simply turned on, the palladium becomes incandescent. The density of pure palladium, fused, but not hammered, is 11.4 at 22.5° Cent.

Palladium is soluble in zinc, but does not combine with it ; for when the alloy is treated with hydrochloric acid, only palladium remains. With tin it is otherwise. If palladium, with six times its weight of tin, be fused at a red heat, and when cold the alloy treated with muriatic acid, a brilliant crystalline compound remains, having a composition corresponding to the formula $Pd_3\,Sn_2$.

Silver and copper, which so closely resemble palladium, furnish by the same process compounds having the same form and composition, $Ag_3\,Sn_2$ and $Cu_3\,Sn_2$.

Rhodium.—Several processes have been described by chemists for obtaining rhodium from the platinum residues. The method adopted by the authors is as follows:—A peculiar substance occurs among the platinum residues which is particularly suitable for yielding rhodium, and which will be described further on. The residues are fused at a red heat, with their own weight of lead and twice their weight of litharge ; when the oxide of lead is quite fluid, the crucible is agitated once or twice, and allowed to cool slowly. The mass of lead is removed and well cleaned. It contains all the metals present in the residues which are less oxidizable than the lead. It is treated with nitric acid, diluted with its own weight of water, which removes the lead, copper, and palladium. The metallic pulverulent substance remaining is well washed, and then mixed, with extreme care, with five times its weight of peroxide of barrium, powdered and accurately weighed. The mixture is heated to redness in an earthen crucible for one to two hours, then treated with water and aqua regia, which volatilizes a great quantity of osmium (this may be either allowed to escape or condensed). When the liquor has lost all odour, a quantity of sulphuric acid, exactly equivalent to the baryta originally employed, is then added. The solution is filtered, evaporated, with the addition of a little nitric acid, and, after some time, a great excess of sal ammoniac ; the evaporation is carried to dryness at 100° C., and the residue washed with a concentrated solution of sal ammoniac, which removes all the rhodium, forming a rose-coloured solution. This is evaporated with a great excess of nitric acid, which destroys the sal ammoniac ; and when the rhodium salt only remains, it is moistened, in a porcelain crucible, with sulphide of ammonium, and mixed with three or four times its weight of sulphur. The mixture, heated to bright redness, yields metallic rhodium, which, when boiled successively with aqua regia and concentrated sulphuric acid, may be considered as practically pure. To obtain it in a state of more absolute purity it

* When silver is submitted to this temperature, the oxygen being kept in slight excess in the flame, the silver boils like mercury and is converted into vapours of oxide, which condense of a clear yellow colour.

is necessary to alloy it with zinc, which is then dissolved in aqua regia, and treated with an excess of ammonia; after boiling for some time, and suitable evaporation, a yellow salt is obtained, which is the chloramidide of rhodium. This may be recrystallized several times, and then calcined with sulphur in a carbon crucible at a high temperature when the pure rhodium is obtained. Its fusion may be effected either in the furnace already described, or in the apparatus used for platinum (see further on).

Rhodium fuses less easily than platinum; thus the means which will liquefy 300 grammes of platinum will only fuse 40 to 50 of rhodium. It does not present any appearance of volatilizing, but it very superficially oxidizes, like palladium and silver it dissolves oxygen gas when melted in contact with the air. When fused in contact with lime, it loses a little silicium which generally accompanies it, and a trace of osmium, and acquires physical properties eminently useful. Not so white and bright as silver, it more resembles aluminium. It is ductile and malleable, but only in a state of great purity, at least after fusion. The density of fused rhodium in a state of purity is 12.1.

The alloys of rhodium are prepared in the same manner as those of palladium. It is remarkable that at the moment of their formation, a very great elevation of temperature takes place. The zinc compound resists the action of hydrochloric acid, but, curiously enough, in contact with air and the acid, it rapidly acquires a very marked rose coloration, indicating an oxidation of the two metals. The formula of the zinc compound is $Rh\ Zn_2$; the tin compound, Rh Sn.

Platinum.—With the exception of palladium, platinum is the most fusible metal of the group; and when subjected to the prolonged action of a temperature considerably above its fusing point, it volatilizes in sensible quantity. At the moment of solidification it bubbles in the same manner as silver, but this phenomenon can only be observed with 500 to 600 grammes of the fused metal, and when allowed to cool slowly it does not occur.

The best commercial platinum always contains a portion of osmium and silicium, and generally a trace of iridium. The authors effect its purification by fusing it in vessels of lime with a powerful oxidizing flame. Under these circumstances the osmium is dissipated as osmic acid, and the silicium passes into the state of silicate of lime, which fuses into a colourless drop, and floats about on the surface of the metal until it reaches the sides of the furnace, when it is immediately absorbed. By this means the metal is most perfectly refined. The fused and purified platinum is of the *same degree of softness as copper*. It is whiter than ordinary platinum, and does not possess that porosity which has hitherto been the chief obstacle to the manufacture of an impermeable coating to other metals. Fused platinum possesses also the power of condensing gases upon its surface, and of producing the phenomena of the flameless lamp. Its density is 21.15, which is less than that of ordinary platinum which has been hardened by powerful beating.

The apparatus which is used for the fusion of the platinum is represented in section in fig. 2. It consists of a blowpipe exactly similar to the one already described, and of a furnace (A B), which is composed entirely of lime encircled by bands of iron. The furnace is cylindrical, and consists of two parts, which fit closely together, but may be readily separated: the roof (A A), which is slightly arched, and contains an opening (Q) into which the end of blowpipe fits; and the hole (B), which is large enough to furnish space for a layer of melted platinum 3 to 4 millimetres, or more, deep, and has a groove at D, by which the flame may issue and the melted metal be also run out, which should slightly project outwards and incline down to the interior. Pure hydrogen may be used as the source of heat with the greatest advantage, but coal gas has been generally employed. The combustion is supported by a current of oxygen. For the fusion of considerable quan-

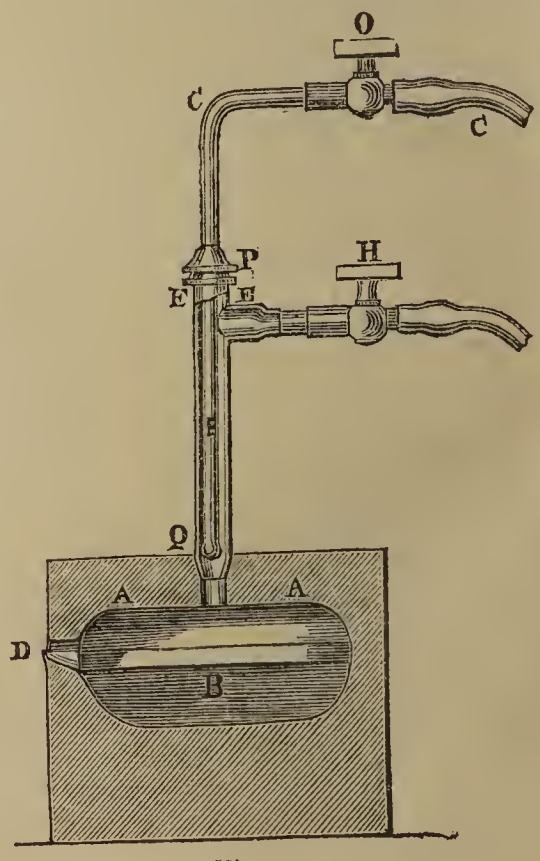

Fig. 2.

tities of platinum—12 to 15 kilogrammes, for instance—it is necessary that the taps of the blowpipe should be of sufficient size. The tap H should have an opening for the passage of the gas of from a square centimetre to 75 square millimetres at least; and the platinum nipple from which the oxygen passes should be 2 millimetres in diameter. The oxygen should be under a pressure of 4 to 10 centimetres of mercury.

When a fusion is to be effected, the parts of the furnace are adjusted together as represented in the figure, the blowpipe is held in the hand, the tap partially opened, and the gas lighted, a feeble current of oxygen being at the same time supplied. The flame is then passed into the furnace by the opening Q, taking care to avoid a slight explosion, which may disturb the arrangement of the apparatus, and the furnace gradually heated up to the maximum by occasionally increasing the current of gas ; the platinum nozzle carrying the oxygen being fixed in its proper position by means of the screw P. The platinum is then gradually introduced by the opening D. If the metal is in very thin pieces there is scarcely time for its introduction, for it fuses almost at the moment it enters the furnace. The oxygen should be supplied at about four or five centimetres of mercury pressure, which communicates a gyratory motion to the platinum, and regulates the temperature of the whole mass. When the fusion is complete and the metal perfectly refined, as indicated by no more vitreous matter forming at the surface, if it is not wished to run the metal out, the current of the two gases is diminished, the reducing or hydrogen gas being left in slight excess. This gas rapidly combines with the oxygen dissolved in the platinum, and a sensible ebullition of the metal is manifested. Ultimately the solidification is complete, and the fire may be extinguished. A portion of the metal is always projected to the roof, but is easily collected. When the metal is to be cast into ingots, moulds are prepared either of thick cast iron well rubbed with plumbago, of gas carbon, or lime. The latter are easily made by sawing plates of the material and binding them together by iron wire. The roof of the furnace is removed, the hearth grasped by a pair of tongs, and the metal run out, without more haste than would be made in the case of any ordinary metal. The only inconvenience which is at first experienced, and which is soon overcome, is to distinguish the opening of the mould from the dazzling surface of the metal. It is not safe to operate in this manner with a larger quantity than three or four kilogrammes of metal, and when a greater mass has to be worked, the authors employ a larger furnace, encased in iron and mounted on a stand, by which the whole may be more readily inclined. Lime was chosen as the most suitable material for the construction of furnaces—firstly, because it is the worst conductor known—so much so, that with a furnace containing melted platinum, the sides of which were at most two centimetres thick, the exterior was scarcely 150° Cent. ; secondly, because it is the best radiator ; and, thirdly, because it acts on all the impurities which it is desired to remove from the platinum, iron, copper, silicium, &c., transforming them into fusible compounds, which are then readily absorbed—thus resembling in action a cupel.

As the result of several experiments, it appears that to effect the perfect fusion and refining of each kilogramme of platinum requires about 100 litres of oxygen, and the whole cost is calculated to be under half a franc.

The above method may be applied to the revivification of old platinum with great advantage. No foreign metal excepting iridium and rhodium can exist in the platinum after it has been submitted to this process of refining. All the substances which most readily attack platinum, sulphur, phosphorus, arsenic, gold, together with soda, iron, copper, palladium, and osmium, are separated either by oxidation, by absorption into the lime, or by volatilization. Gold and palladium pass off in vapour, and may be collected by attaching an earthenware tube to the opening at which the gases escape. The form of the furnace which is employed may be so modified as to admit of two blowpipes if necessary. It will be seen, therefore, that the quantity of platinum which may be melted is almost unlimited, and that in reality this metal is extremely easy to melt, to run out, and cast ; for it remains liquid some time in lime moulds previously heated up to 500° or 600° Cent. Moreover, several furnaces may be employed, 25 to 50 kilogrammes being melted in each, and the whole run into one mould. The authors recommend that the layer of melted metal in the furnaces should never exceed 4 to 5 centimetres in thickness, unless it can be maintained in constant agitation, either by the current of gas from

the blowpipe or by lime stirrers, because it is so bad a conductor of heat, that it would not remain fluid throughout its mass.

Platinum forms an alloy with tin, which crystallizes in cubes and has the composition $Pt_2 Sn_3$. It is formed by fusing the platinum with six times its weight of tin, allowing the mass to cool slowly, and then dissolving out the excess of tin with hydrochloric acid. It also combines with the other metals.

Iridium.—This metal is obtained from the crude osmide, which is extracted from the platinum residues either by washing or by fusing with litharge and metallic lead as described for rhodium, and may be powdered by means of zinc. The process of extraction is the same as described for ruthenium, the iridium remaining insoluble after the fusion with nitre and caustic potash. After being well washed, it is heated to whiteness in a carbon crucible, by which it is agglomerated, and then transferred to the lime furnace (fig. 1), where it is heated (using pure hydrogen) in an oxidizing atmosphere to the highest temperature attainable, when it becomes as fluid as mercury. An ingot of iridium is of a pure white, somewhat resembling polished steel. It gives way under a blow, flattening a little, and breaking as a crystalline metal. At a white heat it is more malleable, and it is possible that in this way its crystalline texture might be destroyed, and the metal rolled out in the same manner as zinc. The density of fused iridium is the same as platinum—namely, 21.15. A crystalline alloy of iridium and tin, insoluble in hydrochloric acid, may be formed in the same manner as described for the other metals. It has the composition of Sn_2 Ir. The alloys of iridium with the other metals of this group have been most carefully studied by the authors, and will be further described in the technical portion of the paper. It has been commonly known that the presence of a small quantity of iridium in platinum, when obtained in the usual manner, renders it extremely brittle, and prevents its being worked. This appears to be due, however, to the metal not being homogeneous ; and if it be simply fused, it becomes perfectly malleable, while it obtains increased rigidity. In fact, by only fusing the native platinum, a metal may be obtained which while it possesses all the properties of platinum may contain 15 to 20 per cent. of iridium together with a small quantity of rhodium. These alloys perfectly resist the action of aqua regia, and admit of many valuable applications.

Résumé.—The metals of the platinum group may be divided into two series:—

Equivalent 53.	Density.	*Equivalent* 98.5.	Density.
Ruthenium	11.3	Osmium	21.4
Rhodium	12.1	Iridium	21.15
Palladium	11.8	Platinum	21.15

The order of fusibility may be represented as follows, the most refractory being the highest, and the most fusible the lowest, in the list:—

Osmium.
Ruthenium.
Iridium.
Rhodium.
Platinum.
Palladium.

ON THE COMPARATIVE VALUE OF CERTAIN SALTS FOR RENDERING FIBROUS SUBSTANCES NON-INFLAMMABLE.

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(*A Communication read before the British Association for the Advancement of Science, at Aberdeen, the 15th September*, 1859.)

(*Continued from page* 387.)

Solutions containing only ten per cent. of anhydrous carbonates are quite effective. Both salts, however, cannot be practically applied, because the carbonate of potash is deliquescent, and the carbonate of soda is highly efflorescent, and thereby converted into dust, which does not adhere, and injures the transparency of

the fabric. If we try to explain the action of these salts, three reasons offer:—The reason given by Prater, who attributes their protecting power to the carbonic acid, which, according to Gay-Lussac and Thenard, leaves the alkali at red heat under the influence of water gas. This explanation is proved to be correct by the inflated appearance of the cinder remaining. Another reason is contended for by De Hemptine, who thinks that it is the water gas as well which prevents ignition, by leaving the crystals at high temperature. Against this theory we must quote other salts, which, like the phosphate of soda, are almost useless, although they contain a much larger amount of water. A third theory, which we beg to suggest, is, that the carbonate of soda acts by firmly enveloping the fabric in a fused state, and that the carbonate of potash, which does not become liquid at a temperature when muslin would begin to burn, surrounds the fibre in its solid state, so as to prevent the contact with the air. This theory is supported by the fact that other substances, which do not give off gases, and are fusible at a high temperature only, can protect the fibre.

The hydrate of soda, for instance, protects in an eight per cent. solution, and the cinder remaining does not appear to be fused.

The bicarbonate of soda acts better than the carbonate, inasmuch as it contains another equivalent of carbonic acid, a six per cent. solution being sufficient. But the second equivalent is given off so very readily, that a piece of muslin prepared with this salt, and brought in contact with a flame for a second or two, caught fire after all; and this inconvenience cannot be removed by applying a more concentrated solution.

Of *borax*, one of the oldest expedients recommended, a twenty-five per cent. solution is the weakest that can be applied; this corresponds to 13.2 per cent. of anhydrous salt. A piece of muslin prepared with borax, and then ironed, was perfectly rotten, whereby the application of this salt becomes at once impracticable. The alkalinity of the salt was first assumed as the cause of this action; but it was found that borate of ammonia acts in a similar way, even when applied in very small proportions. It then became evident that the boracic acid must have the peculiar corrosive property, a fact which was fully proved by using this substance by itself. Boracic acid does not protect the fabric, not even a concentrated solution; but the fabric, when ironed, becomes entirely rotten.

Of *phosphate of soda*, a solution containing thirty-two per cent. of anhydrous salt, or eighty per cent. of crystals, is required; so that the muslin gets perfectly hardened by the large quantity of salt.

Sulphate of soda was found not to act as a protector, although a hot concentrated solution, containing seventy-two per cent. of crystals, was used.

But *bisulphate* was found to act in a twenty per cent. solution, and

Sulphite of soda in a twenty-five per cent. solution. Both these salts are of course injurious to the fabric.

Silicate of soda, or water-glass, was recommended as an anti-flammable by Fuchs, on occasion of the conflagration of the Theatre Royal at Munich, and by many chemists since. A report on the applicability of this salt, by a commission of the Society of Arts of Berlin, in 1841, however, is exceedingly unfavourable. (*Verhandlungen des Gewerbe Vereins*, vol. xlix.) They think it unfit for the protection of buildings, because a coating of it cracks and scales off, and does not enter into the fibre of the wood. It may be considered more useful for paper and certain fabrics, although it gives them an unpleasant japanned appearance if applied in a concentrated solution, and it makes them very rough if more diluted.

The water-glass we used in our experiments contained 37.7 per cent. of sesquisilicate of soda, and 6.3 per cent. of caustic soda. We had to mix forty parts of this viscid liquid with sixty parts of water, to obtain a solution of minimum strength, which contained 15.5 per cent. of silicate, and 2.5 per cent. of caustic soda.

Stannate of soda gave a satisfactory result with a solution of twenty per cent. of crystals, or 15.9 per cent. of anhydrous salt; but it cannot be applied, because it is strongly alkaline and hygrocopic.

As white lead may be replaced, in an economical point of view, by tungstate of lead, the *tungstate of soda* ranges among the salts which are manufactured on a large scale and at a cheap rate. This salt, although it contains only ten per cent. of water, and does not evolve gaseous products at high temperatures, and although it is not easily fused, acts as a most excellent expedient. A solution containing

twenty per cent. renders the muslin perfectly non-inflammable. It acts apparently by firmly enveloping the fibre, and thereby excluding the contact with the air. It is very smooth, and of a fatty appearance, like talcum ; and this property facilitates the ironing process, which all other salts resist. We shall recur to its valuable properties.

The chlorides of potassium and sodium proving to be useless, the corresponding *iodides and bromides* were not tested.

Cyanide of potassium is a good protector in a ten per cent. solution already. It acts by evolving ammonia and carbonic acid at a high temperature, so that the cinder remaining is singularly inflated ; but the high price and the poisonous character of the salt exclude it from practical use.

Passing from the fixed alkalies to certain salts of ammonia, it must be observed that

The carbonate of ammonia cannot be applied, because it is but slightly soluble, and so volatile, that it evaporates during the drying of the prepared fabric.

The oxalate of ammonia aids ignition instead of preventing it ; and as this substance, containing only so small an amount of carbon, has this effect, we did not examine any other organic salts.

The tartrate of potash and soda were found already by Gay-Lussac rather to favour the combustibility.

Biborate of ammonia is effective in a five per cent. solution, but if not carefully prepared, it contains a larger per-centage of boracic acid (four equivalents), and then a larger proportion of the salt is required. Its pernicious influence has already been mentioned ; a solution containing only one per cent. of biborate of ammonia was found to destroy the fabric when ironed.

No salt has been more frequently recommended than

Phosphate of ammonia, by De Hemptine, Gay-Lussac, and other chemists. A ten per cent. solution is sufficient ; but it offers the same resistance to the iron as other salts, and is not a cheap article. Mr. Maugham took out a patent in 1856 for this salt mixed with starch. Mr. Cochran found, however, that if a mixture of salts with a thick paste of starch, like that used by manufacturers, is applied to fabrics, the salts are so unequally divided in the fabrics, that parts of the latter remain inflammable. If a thin paste, like that used by laundresses, is mixed with the salt, the proportion required of the latter is too large. The same remarks apply to the double salt of

Phosphates of ammonia and soda, which acts in a fifteen per cent. solution.

We now beg to direct the attention of the meeting to a salt which, although mentioned by Gay-Lussac as efficacious, has not hitherto been sufficiently held in value. We mean the

Sulphate of ammonia, the cheapest salt of ammonia, because the ammonia obtained in gasworks is generally converted into the sulphate, and then frequently used as a manure. A solution containing seven per cent. of the crystals, or 6.2 per cent. of anhydrous salt, is a perfect anti-flammable. In 1839 the Bavarian embassy at Paris caused M. Chevalier to make experiments before them with a mixture of borax and sulphate of ammonia, as recommended by Chevalier, in preference to the sulphate alone (*Bair. Kunst und Gewerbe Blatt*, 1839). He thought the sulphate would lose part of its ammonia, and thereby give rise to the action of sulphuric acid upon the fabric. This opinion seems to be confirmed by the fact that a solution of sulphate of ammonia gives off ammonia, as observed by Dr. R. A. Smith in his paper on substances which prevent fabrics from flaring ; but, on the other hand, this may be easily counteracted by adding a little carbonate of ammonia, and, besides, the solid salt remains perfectly undecomposed. We now have kept for six months whole pieces of muslin prepared in various ways with this salt, some having been even ironed ; but we cannot find that the texture was in the least degree weakened. Chevalier's mixture, on the contrary, became injurious to the fabric, not only at temperatures above 212°, but even at summer heat ; and this can easily be explained, because he actually did not apply sulphate of ammonia and borax, but biborate of ammonia and sulphate of soda.

Another drawback of Chevalier's mixture is the roughness which it gives to the fabric, and which could only be overcome by calendering the pieces, while sulphate of ammonia by itself has not this effect.

The use of this salt must therefore be strongly recommended, and we shall state at the termination of this review, how it is to be applied.

The sulphite of ammonia acts in a solution containing ten per cent. It is deliquescent.

The chloride of ammonium is effective only in very concentrated solutions, containing at least twenty-five per cent., whereas of the

Iodide and bromide of ammonium a five per cent. solution only is required. But the action of the chloride resembles that of the bicarbonate of soda, in as far as it volatilizes before the fabric takes fire; and so large a quantity is therefore required, that it renders the muslin stiff, and injures its appearance.

The iodide and bromide of ammonium are of course salts too expensive to allow of their application.

Gay-Lussac recommended *a mixture of phosphate of ammonia with chloride of ammonium*, and Messrs. Thouret and Schussel, who obtained a patent for this mixture in 1857, mix three parts of sal ammoniac and two parts of phosphate. It is cheaper than phosphate alone, although more expensive than the sulphate, but it resists the ironing as much as other salts, and offers no particular advantage.

Some of the salts of the earthy and metallic oxides having been recommended, we conclude by stating their comparative value.

Chloride of barium protects as a fifty per cent. solution only.

Chloride of calcium is efficacious in a solution containing ten per cent. of the dry salt, or 19.7 per cent. of crystals; but any application is excluded by the deliquescence of the salt.

Biphosphate of lime has likewise been proposed by Domillard and Mary (*Bairisches Kunst and Gewerbe Blatt*, 1823). But it destroys entirely the fabric.

Of sulphate of magnesia fifty per cent. are required.

The *tersulphate of alumina* acts in a solution containing fifteen per cent. of the crystals, or 7.7 per cent. of anhydrous salt, but here again the acid reaction makes the application impossible.

Alum has often been proposed, first by Obadiah Wilde (1735), by De Breza (1838), and others. De Breza took out a patent for the use of alum, mixed with boracic acid, sulphate of ammonia, and animal glue.

Of *potash alum* a thirty-three per cent. solution, and

Of *ammonia alum* a twenty-five per cent. solution is required, but both of them injure the appearance as well as the strength of fabrics. Of

Sulphate of iron fifty-three per cent. is required, equal to 28.8 per cent. anhydrous salt. This salt has been used by Payne to protect the wood of several public buildings in London. (*Mech. Mag.*, vol. 49.) Of

Sulphate of copper a solution containing eighteen per cent. is efficient. The muslin prepared with it gives off vapours of sulphuric acid, and the cinder remaining consists of red protoxide of copper. The properties of the salt interfere with its application.

Sulphate of zinc is efficacious in a solution containing twenty per cent. of the crystals, although Gay-Lussac was of opinion that it would not suppress the flame. The salt is poisonous.

Chloride of zinc, the subject of a patent of Sir W. Burnett, acts in a solution of eight per cent. of the crystals, or 5.8 per cent. of anhydrous salt. The great tendency to attract moisture makes this salt quite unfit for more delicate fabrics; it may, however, be used for rendering oil paint non-inflammable, as communicated in the Report of the Commission of the Society of Arts at Berlin, 1841.

Chloride of tin is efficacious in a solution of five per cent. of the crystals; it is, however, too acid and deliquescent. Equally efficacious is the *double salt of protochloride of tin and chloride of ammonium*, acting in a five per cent. solution. This salt, although colourless by itself, soon becomes yellow by the action of the air, which interferes with the introduction into delicate fabrics.

Pinksalt is very efficacious; a solution of seven per cent. being sufficient. But fabrics prepared with it are destroyed at a temperature of 212° Fahr., even with a perfectly neutral solution. The four salts last mentioned owe their preserving property chiefly to the fact, that heavy vapours absorbing a great deal of heat are evolved by them.

With regard to the other salts, we beg to draw the following conclusions:—

Every inorganic salt, if applied in solution to fabrics, diminishes their inflammability by absorbing heat and excluding the free access of the air. Even those salts, which, like saltpetre, give off oxygen and assist ignition, prevent fibrous substances from flaming, and even those salts, which, like chloride of sodium, proved not to protect the fibre, would most likely do so, if solutions concentrated enough could be obtained. More active than other salts are those which are easily fusible, such as borax, or partially or entirely volatile, such as certain ammoniacal salts, or those which, owing to their peculiar physical constitution, prevent the access of the air, such as the tungstate of soda. Of all the salts experimented upon, only four appear to be applicable for light fabrics.

These salts are the

1. *Phosphate of ammonia.*
2. *The mixture of phosphate of ammonia and chloride of ammonium.*
3. *Sulphate of ammonia.*
4. *Tungstate of soda.*

The Sulphate of Ammonia is by far the cheapest and most efficacious salt, and it was therefore tried on a large scale. Whole pieces of muslin (eight to sixteen yards long) were finished, and then dipped into a solution containing ten per cent. of the salt, and dried in the hydro-extractor. This was done with printed muslins, as with white ones, and none of the colour gave way, with the sole exception of madder purple, which became pale. But even this change might be avoided, if care be taken not to expose the piece while wet to a higher than ordinary temperature. Most of these experiments were made at the works of Mr. Crum and of Mr. Cochran. The pieces had a good finish, and some of them were afterwards submitted to Her Majesty for inspection, who was pleased to express her satisfaction.

Mr. Crum, who prepared some dresses with phosphate and some with sulphate of ammonia, arrives at the result, that, with the phosphate, the finish is chalky and not transparent enough, whereas the finish with the sulphate is successful.

Other pieces, prepared with the sulphate, were exhibited in the Exhibition of Inventions of the Society of Arts, and at the conversazione of the Pharmaceutical Society, in July last. If we repeat our observation, that during the space of six months, none of the fabrics prepared with sulphate of ammonia have changed either in colour or in texture, we consider it to be an established fact, that the sulphate of ammonia may be most advantageously applied in the finishing of muslins and similar highly inflammable fabrics.

We felt, however, the necessity of inquiring further into the effect which ironing would have upon fabrics thus prepared. For all the above-mentioned salts, being soluble in water, require to be renewed after the prepared fabrics have been washed.

Now, the sulphate of ammonia does not interfere with the ironing so much as other salts do, because a comparatively small proportion is required; but still, the difficulty is unpleasant, and sometimes a prepared piece, after being ironed, showed brown spots like iron-moulds. On covering the iron with plates of zinc or brass, these spots did not appear; but the difficulty still existed, and a white precipitate covering the plate, showed evidently that it is the volatile nature of the salt which interferes with the process. An attempt to counteract this action of the salt, by adding wax and similar substances to the starch, remained also without any result.

For all laundry purposes, therefore, the Tungstate of Soda only can be recommended. This salt offers only one difficulty, viz., the formation of a bitungstate of little solubility, which crystallizes from the solution. To obtain a constant solution, this inconvenience must be surmounted; and it was found that not only phosphoric acid, in very small proportion, keeps the solution in its original state, but that a small per-centage of phosphate of soda has the same effect.

The best way of preparing a solution of minimum strength is as follows:—A concentrated neutral solution of tungstate of soda is diluted with water to 28° Twaddle, and then mixed with three per cent. of phosphate of soda. This solution was found to keep and to answer well; it has been introduced into Her Majesty's laundry, where it is constantly being used.

The effects of the soluble salts having been thus compared, a few remarks are necessary respecting the means which may be adopted permanently to fix anti-

flammable expedients, so that the substances prepared may be wetted without losing the property of being non-inflammable. This aim has been kept in view by a writer in the *Mittheilungen des Gewerbe Vereins für Hannover*, 1843, who tried to fix sulphate of lime in the fibrous fabric without success, and also by Mr. Morin, who tried to fix oxide of zinc by glue and by tannic acid, but without success. (*Journal für praktische Chemie*, vol. xxiv., p. 281.) We tried equally unsuccessfully to fix *sulphate of baryta*, *phosphate of alumina*, and some of the *silicates of alkaline earths and of earths*, by precipitating them by double decomposition in the fibre; they all, however, wash out, and none of them acts as a perfect anti-flammable.

Relying upon the property of alumina as a mordant, we tried the combination of *oxide of zinc and alumina*, obtained by mixing solutions of oxide of zinc in ammonia, and of alumina in caustic soda; but, although this precipitate protects the fibre, it does not adhere to it when washed.

The oxychloride of antimony, obtained by precipitation from an acid solution of chloride of antimony by water mixed with only a little ammonia, is a good anti-flammable, and it withstands the action of water, but not that of soap and soda. We did not find that the solution of this and other salts in muriatic acid injured the texture of the fabric, as long as this was dried at an ordinary temperature.

The borate and phosphate of protoxide of tin act effectually, if precipitated in the fibre from concentrated solutions of these salts in muriatic acid by ammonia; they withstand the influence of washing, but give a yellow tinge to the fabrics.

The same remarks apply to *arseniate of tin*. *The stannates of lime and zinc* protect the fabric, but do not withstand the action of soap or soda.

The oxides of tin give a favourable result, inasmuch as they really can be permanently fixed ; the yellow tinge, however, which they impart to the fabrics will always confine their application to coarse substances, such as canvas, sail-cloth, or ropes. The binoxide does not act so well as the protoxide, it may be, because it cannot be applied in a sufficiently strong state, the bichloride of tin being too acid, at least when containing nitric acid, and the stannate of soda not yielding the amount of binoxide required; for a large quantity of oxide of tin is necessary. The best way to prepare sail-cloth permanently non-inflammable is as follows:—The canvas is first soaked for two days in a solution of protochloride of tin containing two parts of crystallized salt in one part of water, and afterwards left for one day in a concentrated solution of either stannate of soda or carbonate of soda. On making use of the latter salt, we sometimes observed the formation of anhydrous protoxide of tin; and we found this always to be the case when solutions of protochloride of tin and carbonate of soda, quite concentrated, although cold, were mixed, so that the soda was in excess. The formation of the black anhydrous protoxide sometimes occupied twelve hours' time. It could be converted into the ordinary hydrate, by boiling it with protochloride of tin, and its formation could be prevented by agitating the canvas in the solution of soda.

The canvas thus prepared must be dried and then washed, to remove the excess of precipitate. Salt-water does not remove the tin from the canvas.

A few yards of sail-cloth thus prepared have been exhibited in the Society of Arts exhibition of inventions.

A piece about forty yards in length has been prepared by order of the Storekeeper General of the Royal Navy; but it was found to have lost in strength, and increased in weight too much, too allow of its application.

These experiments, however, being the first successful attempts permanently to fix some anti-inflammable agents, may have some interest, although they leave but little hope that the result of *fixing* anti-flammable expedients will ever be obtained without injuring the fabrics.

In concluding our investigation, we trust that we may have succeeded, as far as possible, in answering the questions raised by us in the beginning of this paper.

By determining the comparative value, and ascertaining the difficulties which have prevented, till now, the general use, of protecting agents, we were led to exclude a number of salts hitherto proposed, and to advocate the adoption of sulphate of ammonia, and of tungstate of soda, in manufactories of light fabrics, and in laundries.

We hope, therefore, that the general introduction of these salts will soon greatly reduce danger and loss of life through fire.

TABLE

Showing the smallest per-centage of Salts required in Solutions, for rendering Muslins Non-Inflammable ; A, of Crystallized ; B, of Anhydrous Salts. Twelve square inches of the Muslin employed weighed 33.4 grains.

Name of Salts.	Formula of Salts.	A.	B.	Remarks.
Caustic Soda	NaO, HO	8	6.2	Injurious to the fabrics.
Carbonate of Soda	$NaO\ CO_2, 10\ HO$	27	10	
Carbonate of Potash	$KO\ CO_2, 2\ HO$	12.6	10	
Bicarbonate of Soda	$NaO\ 2\ CO_2, HO$	6	5.4	Not sufficiently efficacious; too volatile.
Borax	$NaO\ 2\ BO_3, 10\ HO$	25	13.2	Destroys the fabrics above 212° Fahr.
Silicate of Soda	$2\ Na\ O\ 3\ SiO_3$	...	15.5	Injures the appearance of the fabrics.
Phosphate of Soda	$2\ NaOHO\ PO_5, 24\ HO$	80	32	Not sufficiently efficacious.
Sulphate of Soda	$NaO\ SO_3, 10\ HO$	...	...	A concentrated 72 p. c. solution is insufficient.
Bisulphate of Soda	$NaO\ 2\ SO_3.\ HO$	20	18.5	Destroy the fabrics.
Sulphite of Soda	$NaOSO_2, 10\ HO$	25	10.3	
Tungstate of Soda	$NaOWO_3, 2\ HO$	20	16	*Recommended on account of its being the only salt not interfering with the ironing of the fabrics.*
Stannate of Soda	$NaOSnO_2, 3\ HO$	20	15.9	Injurious.
Chloride of Sodium	$Na\ Cl.$	...	...	Concentrated solutions are insufficient.
Chloride of Potassium	$K\ Cl.$			
Cyanide of Potassium	$K\ Cy$	...	10	Poisonous.
Sesquicarbonate of Ammonia	$2\ NH_4\ O\ 3\ CO_2, 3\ HO$	...	...	Not available.
Oxalate of Ammonia	$2\ NH_4\ OC_4\ O_6, 2\ HO$	...		
Biborate of Ammonia	$NH_4\ O, 2\ BO_3, 4\ HO$	5	3.6	Destroys the fabrics above 212°.
Phosphate of Ammonia	$2\ NH_4\ O\ HO\ PO_5$	...	10	Efficient, but expensive.
Phosph. of Ammonia and Soda	$NaO\ NH_4\ OHO\ PO_5, 8\ HO$	15	9.8	Expensive, and scarcely sufficiently efficacious.
Sulphate of Ammonia	$NH_4\ O\ SO_3, HO$	7	6.2	*Very efficient, and recommended on account of its low price.*
Sulphite of Ammonia	$NH_4\ O\ SO_2.\ HO$	10	9	Deliquescent.
Chloride of Ammonium	$NH_4\ Cl.$	...	25	Not sufficiently efficacious.
Iodide of Ammonium	$NH_4\ I$	...	5	Too expensive.
Bromide of Ammonium	$NH_4\ Br.$	...	5	
Urea	$C_2\ H_4\ N_2\ O_2$	...	40	
Thouret's Mixture	$3\ (NH_4\ Cl.)$ + $2\ (NH_4\ OHO,\ PO_5)$	...	12	Efficient, but expensive.
Chloride of Barium	$Ba\ Cl.$	...	50	Not sufficiently efficacious.
Chloride of Calcium	$Ca\ Cl, 6\ HO$	19.7	10	Deliquescent.
Sulphate of Magnesia	$MgOSO_3, 7\ HO$	50	24 3	Not sufficiently efficacious.
Sulphate of Alumina	$Al_2\ O_3\ 3\ SO_3, 18\ HO$	15	7.7	Destroys the fabric.
Potash—Alum	$KOSO_3\ Al_2\ O_3\ 3\ SO_3, 24\ HO$	33	18	Not efficacious enough, and destroys the fabric.
Ammonia—Alum	$NH_4OSO_3\ Al_2\ O_3\ 3\ SO_3, 24\ HO$	25	13	
Sulphate of Iron	$FeOSO_3, 7\ HO$	53	28.8	Not sufficiently efficacious.
Sulphate of Copper	$CuOSO_3, 7\ HO$	18	10	Poisonous.
Sulphate of Zinc	$Zn\ OSO_3, 7\ HO$	20	11.2	
Chloride of Zinc	$Zn\ Cl, HO$	8	5.8	Deliquescent.
Protochloride of Tin	$Sn\ Cl, HO$	5	4.6	Deliquescent.
Protochloride of Tin and Ammonium	$Sn\ Cl\ NH_4\ Cl\ HO$	5	4.7	Becomes yellow when exposed to the air.
Pinksalt	$Sn\ Cl_2\ NH_4\ Cl.$	...	7	Injures the fabric.

TABLE

Showing the increase in weight of Muslin prepared with various anti-flammable expedients.

Muslin (not starched) prepared with a solution of	Increased in weight about
7 per cent. of Sulphate of Ammonia	18 per cent.
10 per cent. of Tungstate of Soda ...	27 per cent.
12 per cent. of Thouret's compound ..	24 per cent.

In the manufacturing process the weight increases at a somewhat higher rate : a piece of starched tarlatan, weighing about 8½ oz., took up about 2 oz. of sulphate of ammonia from a 10 per cent. solution.

Chemical Laboratory,
Bury Court, St. Mary Axe, London, E.C.
October, 1859.

INTRODUCTION OF THE TEA PLANT INTO THE UNITED STATES.

A FEW years ago the United States Government was led to take measures for the introduction of the tea plant into the confederation, with a view to establishing, if possible, the preparation of tea in some of the States. The success that had attended Mr. Fortune's operation for the East India Company, having induced them to consult that gentleman, it was finally arranged that he should again proceed to the Celestial Empire, for the purpose of obtaining as abundant a supply of plants for the west as he had secured for the east. His mission has been attended with the most complete success. A minute of the United States Patent Office now before us, states that he was despatched in March, 1858, that he had obtained seeds enough to plant 100 acres, a large portion of which had arrived by the 20th June, 1859, and was flourishing in a propagating house, especially constructed at Washington for their reception. Applications for plants were even then made in such numbers, that it had become necessary to refer to Congress for instructions as to their disposal.

Mr. Fortune returned to England some time ago, and has favoured us with the following intercsting report upon the final result of his expedition :—

"It will be seen by the accompanying papers that the results of my expedition to China, for the Government of the United States, has been very satisfactory. In little more than one year about 50,000 tea plants, and many other vegetable productions useful in the arts, or of an ornamental character,* have been introduced to America from the tea countries of China.

"This success was mainly owing to experience acquired during former visits to these countries. Arriving in China in the month of May, I spent the first few months in visiting numerous tea farms in different parts of the country, where I made arrangements with the natives for large supplies of seeds as soon as they ripened in the autumn. In October and November I repeated my visit to the same districts, and everywhere found supplies of seeds awaiting me. In former transactions with these tea growers, I had always treated them kindly and liberally, and I now found the advantage that resulted from such treatment. Seeds had been saved for me in all directions ; I had only to pick them up and proceed onwards, and was thus enabled to get through a large amount of work in a short space of time. In December I reached the seaport of Shanghai, with the whole of my collections in excellent condition.

"Tea seeds will not retain their vitality long if kept out of the soil. In order to guard against all risk, a large number of Ward's cases had been previously prepared and filled with earth, and to these the seeds were immediately transferred. The first shipment was made in December, a few days after my arrival in Shanghæ. Knowing that the vessels would probably arrive in America about the middle or end of March, I thought it likely the seeds would remain in the earth without vegetating during the voyage. Instead, therefore, of sowing the seeds near the surface in the usual manner, I mixed up large quantities with soil, and filled the case up with the mixture of earth and seeds. By this simple plan many thousands of seeds were carried to their destination, and when they arrived there were as sound as if they had been all the winter on a Chinese seed-bed. Of course it was necessary to unpack them immediately on arrival, and sow them thinly in other quarters. In the other cases which were shipped later, this mode of packing would not have been safe. The seeds were therefore sown thickly and covered with earth

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* For example: the Camphor and Tallow trees, Chusan Palm, green dye plant (Rhamnus), manure plants (Trifolium and Coronilla), Wax-insect tree (Fraxinus chinensis), Yang-mae (Myrica sp.), southern fruits, such as the Lee-chee, Longan, Wampee, &c. &c.

in the usual manner, and in this state might vegetate on the voyage without any risk whatever. In the one case the object was to get the seeds quickly to their destination without vegetating, for had this taken place the experiment would have been a failure; in the other they were placed in circumstances favourable for vegetation, and the only change likely to occur would be this, that in China they were only seeds, while towards the end of the voyage or at its termination they would have changed into healthy young plants.

"The watering, closing the cases, shipping, and last, but not least, securing the good-will of captain and officers, were all important operations."

Not only has the tea plant been thus introduced to the eastern states, but it has found its way also to the western; and our friends on both the Atlantic and Pacific sides are with their usual energy setting about growing it.

But there still remains the question whether they can turn it to profitable account. That their climate will be found to suit in some of the vast regions of the west there can be no reasonable doubt. But merely growing tea plants will not make commercial tea. The difficulty lies in the preparation of it, an operation which, as conducted in China, demands an enormous quantity of labour—the article of which beyond all others the United States have the least to spare. But is it really necessary to prepare tea Chinese fashion?—to chop it up into little balls and twist it into all sorts of queer shapes with all sorts of names, in order to give it its dietetical value? Surely not. We have ourselves found out that the painted article called green tea is not very wholesome and by no means the better for the paint; and we quite anticipate that our United States friends will have even already projected some sort of machine that will produce good marketable tea without the assistance of human hands. This indeed, we know, is the opinion of Mr. Fortune himself.—*Gardeners' Chronicle.*

ON AMYLOID SUBSTANCES AS COMPONENT PARTS OF ANIMAL BODIES, AND ON THEIR USES.

BY DR. CHARLES ROUGET.

According to Dr. Rouget, amylaceous substances are as much a necessary element in the animal economy as protein compounds and fatty bodies. Amylaceous substances, in different conditions, are common in some of those rudimentary forms of animal life which skirt the confines of the vegetable world. They are common in the tissues of the higher animals while in an embryonic condition. They are met with, not only in the liver and in the placenta and amnios, but also in the epithelium of the uterus, vagina, and tongue. In all these cases the red-wine like reaction with iodine is precisely the same as that which is furnished by the glycogenic cells of the liver, placenta, and amnios. According to Dr. Rouget, sugar, instead of being a special secretion of the liver, or of the placenta and amnios before the liver can act, must take rank with urea, creatinine, creatine, &c., as a product of natural waste—a product of the natural waste of the amylaceous element of the organic fabric; or rather it must be looked upon as a result of the waste of a depraved organism, and be placed by the side of uric acid, lactic acid, inosite, &c.

These papers of Dr. Rouget are of considerable importance, and we entirely sympathise in their spirit. There is, no doubt, an inseparable connexion between the animal and vegetable kingdom, and it is not at all likely that amylaceous substances, which play so important a part in the vegetable economy, have nothing to do in animal organisms, and this the more seeing that these substances, in cases of animals having a mixed diet, form so large a portion of every-day food. We sympathise, also, with the view which would refer sugar to a disordered natural metamorphosis of the amylaceous constituents of the body, rather than to a secretive action in certain hepatic or placental cells. At the same time we must admit that as yet the facts are not altogether conclusive.—*Journal de Physiologie*, Nos. 5 and 6, 1859.—*Half-Yearly Abstract of the Medical Sciences.*

PHARMACEUTICAL NOTES ON THE CORNELIAN CHERRY.

BY DR. X. LANDERER.

The *Cornus mascula* grows plentifully in the gardens of Greece, where it is also indigenous.

Its fruit, called *krania*, is greatly prized by the Turks on account of its very agreeable acid flavour. They use the juice of it in different ices and sweetmeats, also to prepare their sherbets or *bosas*, which are very refreshing and very wholesome acidulated, but sweet, drinks. The fruit is also considered very styptic; and hence during the prevalence of cholera it is the only fruit allowed to be sold in the streets and bazaars.

The syrup of *krania* is employed in Greece as that of the raspberry or barberry is in Central Europe. Before the fruit ripens it is put into vinegar to preserve it all the year round, and in this state it is eaten like olives, mad-apples, and tomatos.

This plant was well known to the ancients. Homer tells how the famous poisoner Circe gave its fruits to the companions of Ulysses to put them to sleep. Pliny relates that the fruit of this tree is useful against diarrhœa.

In the East they make use of the flowers also in cases of diarrhœa and hæmorrhages, and the poor collect the kernels to make ornaments.—*Dublin Hospital Gazette.*

INHALATION OF CHLOROFORM.

An interesting paper has just been communicated to the French Academy of Medicine by Dr. Beraud, on the subject of Dr. Faure's method of administering chloroform. This method consists in causing that agent to be inhaled by one nostril only, the other remaining meanwhile in free communication with atmospheric air. The apparatus is extremely simple, consisting of a bottle with two necks or tubulatures, and capable of containing 100 grammes of water. An india-rubber tube with a tapering end is adapted to one of the necks, and is intended for insertion into the nostril; the other neck remains open, the operator stopping it with his thumb when necessary. The tube is 17 centimetres in length, and has a diameter of at least 13 millimetres. To use this apparatus, pour about 10 or 12 grammes of chloroform into the bottle, and having stopped the open tubulature with your thumb, let the patient receive the tube into his nostril, recommending him to breathe naturally. There being no communication between the bottle and the atmosphere, the chloroform does not evaporate, and the patient is not aware of any unpleasant sensation. The subject having now acquired the habit of breathing in that way, the operator gradually slackens the pressure of his thumb, and allows a little air to enter, by which means the patient inhales atmospheric air charged with a little chloroform. From that moment, according as the painful sensation increases or diminishes, the outer air is alternately admitted or excluded, until the thumb being entirely withdrawn, the patient receives the full quantity required. The operation may also be conducted thus:—Let the patient breathe through the empty bottle, and then introduce a drop of chloroform, then another, and so on gradually. The great point is not to allow the effluvia of chloroform suddenly to exercise too irritating an influence upon the respiratory organs. After the second or the third minute the operator should shake the bottle, so as to project the liquor on its sides, by which the evaporating surface is considerably increased. Should the patient happen to open his mouth the operator must close it with his hand. By this process the patient feels no pain, no sensation of suffocation or dyspnœa, nor is there any congestion of the brain. The state of anæsthesia may be continued with the greatest ease, and without danger, by keeping the tube ready to be again introduced into the nostril, if necessary; nor is there any possibility of sudden asphyxia, as the effects of the agent develop themselves very gradually.—*Times.*

PILLS OF CARBONATE OF AMMONIA.

Dr. John Williams, of Cork, has sent us the following formula for administering Carbonate of Ammonia in pills, which, he says, are of great service in chronic

bronchitis, and especially in those cases where the bronchial secretion is viscid and expectorated with difficulty :—

℞ Ammoniaci, gr. ii.
Pulv. Ipecac., gr. ½
Morphiæ Mur., gr. ⅙
Ammoniæ Carb, grs. ii.
Mucilaginis Acaciæ, q. s.
Misce. Fiat pilula.

The pills should be at once coated with a varnish of balsam of tolu, dissolved in chloroform, and they should afterwards be kept in a bottle.

MISCELLANEA.

Alleged Poisoning by White Precipitate.—An inquiry has been held before the coroner at the Swan Hotel, Petworth, respecting the death of the illegitimate child of Harriet Moore, age 20, an inmate of the Petworth Union, who, it is alleged, gave the deceased white precipitate. It was proved that the prisoner had purchased precipitate at a chemist's shop, and that the child had suffered intense pain before its death. Dr. Taylor, of Guy's Hospital, who examined the contents of the stomach of the deceased infant, deposed that he found an insoluble compound of mercury which had all the properties of white precipitate. From the explanations of Dr. Taylor it appeared that this was an extraordinary case, from the fact of white precipitate having been so rarely administered internally ; he knew of only one case, and that was at Chelmsford Assizes, 12 years ago, in which he was engaged. The patient had taken 25 grains and recovered. The whole point was this—whether the system possessed sufficient strength to throw it off by vomiting. The jury, after consulting for about an hour, returned unanimously a verdict of "Wilful murder" against Harriet Moore, who was committed for trial at the next spring assizes, to be held at Lewes.

Death from Chloroform.—On Sunday, Jan. 1st, Dr. Renwick, a medical gentleman in Alloa, expired while under the influence of chloroform, administered to him at his own request and solicitation while undergoing an operation on one of his great toes, the nail of which he had suffered to grow into the flesh. Dr. Renwick had called in the assistance of Dr. Duncanson, and the latter, having poured some chloroform upon a towel, Dr. Renwick held it to his mouth with his own hands. After a little time, as it did not seem to be taking any effect, he asked for more, which Dr. Duncanson at first declined to give ; but, by-and-by, finding that no effect was being produced, some more was applied. As it still seemed to be having no effect, however, another small quantity was, at the patient's own request, applied to the towel, which, after a short time, produced insensibility ; and his pulse having been found full and regular, the operation, which did not occupy more than a minute or two, was successfully performed. He still remained insensible, but his breathing was regular, and all was considered right. Some cold water was then thrown in his face to arouse him, but this not having the desired effect, other measures were resorted to, but with a like unfortunate result ; and when after a few minutes his breathing became less frequent and more laboured, and the appearance of his countenance began to change, and his pulse had become all but imperceptible, serious alarm was felt. Artificial respiration by the modern method was resorted to, and in this manner breathing was kept up for nearly half an hour, but death had taken place. Dr. Renwick was in his twenty-seventh year. He was a native of Musselberg, and came to Alloa about six years ago, where his professional skill, combined with his urbanity of manner, gained him an extensive practice and the esteem of all who knew him. It is supposed that Dr. Renwick had been labouring under heart disease.

Suicide by Chloroform.—A person at Liverpool purchased eight ounces and a half of chloroform, and appears to have poured it into a dish, and inhaled the vapour, thus producing insensibity which resulted in death.

Death from Godfrey's Cordial.—An infant has been poisoned at Doncaster by "an over dose of Godfrey's Cordial, incautiously administered." The mother had been in the habit of giving it to the child to keep it quiet, and on this occasion a tea-spoonful and a half was given.

A New Electric Pile.—A curious combination of elements for a galvanic pile has just been communicated to the Academy of Sciences by M. Marié Davy. It had hitherto been believed that, in order to obtain a regular and powerful current, the substance intended to act upon and dissolve the zinc must itself be soluble. M. Marié Davy shows that this need not be the case, and that it is only requisite that the substance in question be a good conductor and reducible at the same time. With this view he selects sulphate and chloride of lead, the former being quite insoluble in water and the latter nearly so. Sulphate of lead is not much used in manufactures, and yet is produced on a large scale for the preparation of the acetate of alumina, which is used in dyeing. Hence, it may be had cheap. Now, 33 kilogrammes of zinc, costing 25 f., will reduce in the pile 144 kilogrammes of sulphate of lead, and thus produce 104 kilogrammes of lead, value 65 f. There is therefore a difference of 40 f., which will nearly cover the cost of the sulphate, so that the expense of this pile would be very inconsiderable. Its electromotive power is not inferior to that of Daniel's battery. Chloride of lead is dearer than the sulphate, but is preferable in other respects, being a better conductor and yielding a much stronger current. The arrangement of M. Davy's pile is the primitive one in columns. Every element consists of a tinned iron dish, having a disk of zinc soldered to the bottom outside ; the inside is covered with a coating of sulphate of lead of the thickness of several millimetres. When in use each dish is filled with water, its zinc bottom being immersed in the water of the dish immediately below. A column composed of 40 elements thus disposed will form a column of about one metre in height. When the chloride is to be used instead of the sulphate it should be previously cast into thin laminæ, and then broken into fragments, by which means the cleaning of the pile is easier to effect. A pile of this description is actually in use at the Central Telegraph-office, and has been in operation since the 9th.—*Galignani's Messenger.*

Easy Method of Recovering Silver from old Nitrate Baths.—At a meeting of the Photographic Society of Scotland, Dr. B. Simpson described "Dr. Gregory's Method of obtaining Pure Silver," which consists in first obtaining the silver in the form of a chloride by adding a strong solution of common salt to the silver-bath till a precipitate ceases to form. The chloride is then washed by decantation with hot water, and broken down with a glass rod, so as to get rid of all lumps ; it is then, while still moist, covered to about half an inch, with a strong solution of caustic potash (specific gravity 1.25.), and then boiled. The boiling may be performed in a platinum capsule, or a Florence flask answers the purpose. During the boiling the mixture is to be well stirred, and in about ten minutes the mass becomes black; should the oxidation not be complete, the boiling must be repeated. When a small portion of the powder is entirely soluble in nitric acid, the process is complete.

The oxide thus obtained must be thoroughly washed, first with hot, and afterwards with cold water: this operation may be considered complete when the filtrate ceases to precipitate on the addition of a drop of nitrate of silver solution.

The nitrate of silver is obtained from this oxide with great facility by the addition of nitric acid. Evaporate to dryness to drive off the free acid.

At the same meeting Mr. J. T. Taylor stated that he employed, with perfect success, a still more simple process, consisting merely in putting a piece of copper into the silver solution, which effected a decomposition, forming nitrate of copper and metallic silver.

Visitation of Druggists' Shops in France.—On a recent occasion, a Pharmacien, at Choisy le Roi, was fined 400 francs (£20) for having in his shop certain substances in a state of decay, or otherwise unfit for purposes of sale.

Dental Cream.—Under this title, M. Gautier, *Médecin-Dentiste* of Paris, describes a composition which he says is of very great utility in facilitating cutting the teeth. It consists of gum, sugar, and honey, equal parts of each, with *q. s.* of lime-water. This is to be rubbed for several minutes three or four times a day, into the portion of the gum about to be penetrated. The gum becomes softened and thinned, and the tooth is much more easily cut.—*Gaz. des Hôp.*, No. 148.

Ginseng.—A letter from St. Petersburg, dated 24th December, states that a scientific expedition has been organized, under the direction of M. Maak, to describe the interesting valley of Oussory, as well as the south-east of the Mantchoo territory to

the frontiers of Corea, and to examine specially the ginseng (a renowned medicinal plant), to study the geographical extent of the Mantchoo territory where this plant is propagated, and particularly the places in which it grows naturally, and to examine and describe the plantations of the Chinese who cultivate it. A great number of Russians propose to establish plantations of ginseng as an important produce for trade with China.

COURT OF QUEEN'S BENCH.

Westminster, January 21.

(Sitting in Banco, before Lord Chief Justice Cockburn and Mr. Justice Crompton.)

Ladd (Appellant) and Gould (Respondent).

This case was tried before the Kingston magistrates, and a report of the proceedings appeared in our number for November, page 222.

The decision of the magistrates having been unsatisfactory to the prosecutor, the case was brought to this Court.

Mr. Lush, Q.C., for the appellant, said this was a case stated for the opinion of the Court under the New Medical Act, and it raised the question whether the use of the word "surgeon" in connexion with the words "and mechanical dentist" was a using of the title of a surgeon within the 40th section of the Medical Act. The question was whether on the evidence the party was guilty.

Mr. Justice Crompton.—That is a question on which the magistrates were bound to draw their own conclusion from the facts.

Lord Chief Justice Cockburn said he did not think there was any false pretence in using the name of a surgeon.

Mr. Justice Crompton said the respondent had called himself "surgeon and mechanical dentist," which he thought meant much the same as "surgeon-dentist."

Lord Chief Justice Cockburn said the magistrates were of opinion that the case was not within the Act, and he should have come to the same conclusion.

Mr. Justice Crompton thought there was evidence upon which the magistrates might have found either way, but the Court would not find for them.

Mr. Lush said the magistrates meant to leave to the Court whether the evidence brought the party within the meaning of the Act.

Lord Chief Justice Cockburn said he did not think it did, but that was a question of fact. It was like the case of persons who called themselves "surgeon-dentists," who were known not to be so, though some of them were.

Mr. Justice Crompton said it was like the case of the "surgeon-chiropodists." But it was a matter of fact for the magistrates, for the statute gave power to put questions of law only to this Court, not questions of fact.

Lord Chief Justice Cockburn said he did not think there was any falsehood, or any intention to deceive, which was necessary in order to bring the case within the Act. That was also the opinion of the magistrates, though they might have come to a different opinion.

Mr. Justice Crompton said he thought there was evidence upon which the magistrates might have come to either conclusion, but he could not say they were bound to convict.—Judgment for respondent.

ROYAL SOCIETY.

ADDRESS OF SIR BENJAMIN BRODIE, PRESIDENT.

At a meeting of the Society for the Promotion of Social Science lately held, a noble lord (Brougham), a fellow of the Royal Society, called the attention of his hearers to the advantages which the world in general had derived from the cultivation of the physical sciences. No one, indeed, can be better qualified to give an opinion on this subject than the distinguished individual to whom I have alluded. His first communication to the Royal Society was in the year 1796, and was published in the "Philosophical Transactions" for that year. From that time to the present day he has, without any interruption, laboured for the advancement of all

kinds of knowledge, and so he still continues to labour with all the determination and energy and intellectual vigour of youth; and I may confidently affirm that little has been done worthy of note during this interval of 64 years which has escaped his acute observation. The influence, however, which the physical sciences have had in adding to the conveniences and comforts, and advancing the material prosperity of mankind, is too obvious to escape the notice of a much less close observer than Lord Brougham. If our houses and our cities are better and more economically lighted—if our population is better and more cheaply clothed—if our fields are more productive—if we travel by steam, and communicate with those who are hundreds of miles distant from us by the telegraph—if a brighter light shines in our light-houses to guide the mariner at night; these, and a thousand other things besides, are but the result of the application by practical men of the discoveries made in the physical sciences to practical purposes. To the same cause may be attributed much of the political greatness of the British nation. The British flag floats on every sea; our colonies are established in every region of the earth; we contemplate in them with a reasonable pride the germs of future nations, which, when our fortune may possibly be changed, will speak the same language with ourselves; inheriting our literature, our political institutions, and not only our religion, but our religious freedom; inheriting also our knowledge, and adding knowledge to it; but none of this could have been, if it were not that the astronomer had instructed the sailor how, with nothing but the heavens above him and the waters on every side, he may find his exact position on the surface of the globe. But it would be a grave mistake to suppose that such as those which I have now enumerated are the only advantages which have been derived from the cultivation of the physical sciences. To know their full extent we must take into the account, not only the direct, but also the indirect results to which it has led, and I trust that I may be excused if, on the occasion of the present anniversary, I occupy some portion of your time, not by an elaborate discussion of the subject, but by offering to you some suggestions as to the other ways in which inquiries such as those on which you are yourselves engaged, have already affected, and may be expected still more to affect hereafter, the habits, the modes of thought, the fortunes, and moral condition of mankind. It is not our business to depreciate that form of civilisation which existed in times long since past, and especially of that remarkable people who, during some centuries before and after the Christian era, were distinguished for their still unrivalled excellence in art, their noble literature—when Aristotle sat at the feet of his master Plato; when students, in search of intellectual improvement from all parts of Greece, resorted to the Lyceum of Athens; when, from opposite quarters of the Mediterranean Sea, the Greek colonies of Alexandria and Syracuse supplied a list of mathematicians and poets to add lustre to their present state. Neither let us forget what we owe to another people, whose civilisation is to be measured, not by their wealth and luxury, their ambition and their conquests, but by those monuments of art which still draw visitors to Rome—their historians, moral philosophers, and poets. But, great as are the obligations which we owe to these nations of antiquity, it cannot be denied that the civilisation which exists among us at the present time is of a higher order than that which existed formerly, and it is not difficult to show that it is to the greater extension of a knowledge of natural phenomena, and the laws which govern them, that this improvement is mainly to be attributed. Knowledge and wisdom are, indeed, not identical, and every man's experience must have taught him that there may be much knowledge with little wisdom, and much wisdom with little knowledge. But with imperfect knowledge it is difficult or impossible to arrive at right conclusions. Many of the vices, many of the miseries, many of the follies and absurdities by which human society has been infested and disgraced, may be traced to a want of knowledge. It was from a want of knowledge that Roger Bacon was persecuted by the Franciscan monks, and Galileo by the Inquisition; that Servetus was burned by Calvin; while others would have burned Calvin in his turn if they had had the opportunity of doing so. So it was that juries were found to convict and judges to condemn poor ignorant women as witches; that within the last two centuries well-educated men believed that they might read their destiny in the stars; and that as lately as the year 1638, on the occasion of the birth of Louis XIV., Richelieu compelled the dungeons of the Inquisition to give up the astrologer Campanella, in order that he might cast the horoscope of the future King, and so it is at the present day grown-up ladies and gentlemen occupy themselves with the humbler and less

romantic mysteries of turning and rapping tables. Co-operating with a purer religious faith, the advancement of knowledge has humanized our institutions. It has banished slavery; it has caused our laws to be more merciful, and the administration of them more just; it has promoted religious and political freedom; and, with one or two miserable exceptions, it has rendered even despotic Governments more attentive to the claims and wishes of their subjects. If sanitary and other improvements (these being the results of greater knowledge) have added to the average length of human life, be it observed that this fact includes another fact, namely, that they have added to human happiness, for true it is that the causes which tend to the shortening of life are, with few exceptions, such as produce either physical pain or moral suffering. The investigation of the physical sciences is especially favourable to the training of some of the more important faculties of the mind, so that we may well anticipate much ultimate advantage from the movement which is already begun, having for its object, not to supersede these studies of ancient languages and ancient literature (which at the present time, in addition to mathematics, are supposed to form the staple of a first-rate education), but to add an elementary knowledge of the principal physical sciences to the list. The including of some of these at least in the instruction of early life will operate beneficially in various ways. The first step in all physical investigations, even in those which admit of the application of mathematical reasoning, and the deductive method afterwards, is the observation of natural phenomena, and the smallest error in such observation in the beginning is sufficient to vitiate the whole investigation afterwards. The necessity of strict and minute observation, then, is the first thing which the student of the physical sciences has to learn, and it is easy to see with what great advantage the habit thus acquired may be carried into everything else afterwards. Slovenly habits of observation are, indeed, the source of a large proportion of the evils which mankind bring upon themselves; of blunders in private life, by which an individual causes the ruin of himself and his wife and children; of blunders in statesmanship, which bring calamities on nations. It is to these, moreover, that impostors and fanatics of all kinds, and in all ages, have been indebted for their influence and success. It would be easy to show in various other ways that the study of the physical sciences cannot fail to be a useful training for the mind. Very much, indeed, might be said on the subject, but to enter fully into it would not only occupy too much of your time, but would involve us in a metaphysical discussion unsuited to the present occasion. There are, nevertheless, two or three points to which I shall venture briefly to allude. Investigations of this kind, more than almost any other, impress the mind with the necessity of looking carefully at both sides of a question, and strictly comparing the evidence on one side with that on the other, and in this manner they help to correct and improve the judgment. As in every such investigation classification is an important and, indeed, a necessary element, another effect is that of promoting and strengthening the best kind of memory—a memory founded on some actual relation of objects to each other, and not on mere apparent resemblance and juxtaposition. Lastly, physical investigations, more than anything besides, help to teach us the actual value and the right use of the imagination; of that wondrous faculty which, left to ramble uncontrolled, leads us astray into a wilderness of perplexities and errors, a land of mists and shadows; but which, properly restrained by experience and reflection, becomes the noblest attribute of man; the source of the poetic genius; the instrument of discovery and science, without the aid of which Newton could never have invented fluxions, nor Davy have decomposed the earths and alkalies; nor would Columbus have found another continent beyond the Atlantic Ocean. In the pursuit of the physical sciences, the imagination supplies the hypothesis which bridges over the gulf that separates the known from the unknown. It may be only a phantom; it may prove to be a reality. But, as these sciences relate to matters of fact which, if not directly, may be made indirectly cognizable by the external senses, they afford us peculiar facilities, far beyond what exist in other departments of knowledge, of testing the accuracy of the views which the imagination has suggested, so that we may at once determine when it has been too excursive, and, if it has been so, call it back to its right place. There may be instances of mere accidental discovery; but, setting these aside, the great advances made in the inductive sciences are, for the most part, preceded by a more or less probable hypothesis. The imagination, having small light to guide it, goes first. Further observation, experiment, and reason follow.

Thus, for example, it had been long suspected that there is some sort of relation between electricity and magnetism. Much thinking on the subject had strengthened this suspicion in the mind of Oersted. Still it was but an hypothesis, and might even now be regarded by many as no better than a dream, if it had not been that in the year 1820 the Danish philosopher devised the experiments which demonstrated the law of reciprocity between an electric current and the magnet, and the identity of the two forces. As an instance of an opposite kind I may refer to the doctrine of phlogiston, as propounded by Stahl. While the art of chemical experiment was imperfectly understood, that doctrine was very generally received as affording a true explanation of the phenomena of combustion. But no sooner had Lavoisier and his friends introduced a more accurate mode of experiment by weight and measure, than it was proved to have no foundation in reality, and consigned to the same place in the history of science with epicycles and vortices and animal spirits. But the effect of some kind of instruction in the physical sciences being recognized as an essential part of a liberal education may be contemplated under another point of view. Except in the case of particular professions or occupations, profound knowledge of these subjects is not required; but there is no situation in life in which some knowledge of them may not be turned to good account. Is there any country gentleman or farmer who might not derive advantage from knowing something of vegetable physiology and chemistry? Would not a knowledge of scientific botany make a man a better gardener? Is there any county magistrate, or mayor or alderman of a borough, to whom it would not be useful to know something of the principles on which what are called sanitary measures are to be conducted? and is there any one in any situation in life to whom it would not be a benefit to know something of animal physiology, of the functions of his own body, and of the influence which his bodily condition exercises over those moral and intellectual faculties by which he is distinguished from the rest of the animal creation? If it did not teach him how to cure disease, it might be useful for him to know how far disease may cure itself, and what are the limits of nature in this respect? To man, looking at him as an individual, there is no art so important as that of understanding and managing himself—an art so simply and well expressed by the two significant words, Γνωθι σεαυτον, which were inscribed over the heathen oracle of Delphi. To correct bad habits when once acquired is no easy task. A strong sense and a strong will, such as only a limited number of persons possess, are necessary for that purpose. But it would go far towards preventing the acquirement of such habits, if young persons during the time of their education were made to understand the ill consequences to which they must inevitably lead, and how, eventually, the body must suffer and the mind be stupified and degraded, not by the reasonable indulgence, but by the abuse of the animal instincts.

REVIEW.

Eléments de Zoologie Médicale, *contenant la description détaillée des animaux utiles à la médecine et des espèces nuisibles à l'homme, particulièrement des venimeuses et des parasites, précédée de considérations générales sur l'organisation et sur la classification des animaux, et d'un résumé sur l'histoire naturelle de l'homme.* Par A. Moquin-Tandon, Membre de l'Institut (Académie des Sciences), et de l'Académie impériale de Médecine, Professeur d'histoire naturelle médicale à la Faculté de Médecine de Paris, &c. &c. Paris: Baillière, 1860. 8vo, pp. 428. 122 woodcuts.

In reviewing the medicinal substances derived from the animal kingdom, one cannot but be struck with the exceedingly small number that are really important and admit of no substitutes; in fact, one may almost reduce the list to *three*, namely, the Blistering Fly, the Leech, and the Cod-fish. In practice, however, no such limited view of the subject is admissible. A number of other substances claim attention, some on account of their nutritive properties as food for the sick, others as vehicles for the administration of active medicines; one class on account of their colouring matter, and another for their odorous principles. To which may be added a certain number whose repute is to be traced to the ignorance and credulity of a bygone period, rather than to their own intrinsic valuable properties. The student of Materia Medica, and he especially whose aim is the practice of medicine and surgery, will not confine his

attention even within these limits. He will require to know something of the animals whose sting is deleterious, or even poisonous to man, as well as of those parasites to which the human body is liable, and the presence of which in some instances constitutes a disease.

These remarks have been suggested by a perusal of the excellent and comprehensive manual before us—a manual which cannot fail to be of eminent service to the medical and pharmaceutical student acquainted with the rudiments of the French language, and which may also with great advantage find a place, as a standard work of reference, in the library of the physician or comparative anatomist.

Professor Moquin-Tandon has adopted an artificial arrangement of his subject, and we think with good reason. "Most authors," says he,

> "Who have written on Medical Zoology have thought fit to adopt in their works an arrangement purely zoological. This gives to their treatises a form more scientific and less arbitrary, which is, doubtless, a great advantage. But this form, notwithstanding its importance and fixedness, brings with it real inconveniences; it subjects Medical Zoology too much to Zoology proper, and causes some neglect of that professional spirit which, in a faculty of Medicine or School of Pharmacy, ought to prevail through all studies. An author on Medical Zoology who should divide his chapters, taking as guide a work such as the *Animal Kingdom* of Cuvier, would be led to speak of the *Quadrumana* and *Lepidoptera* simply because they constitute two considerable tribes in the zoological series. But neither the healing art nor pharmacy owes anything either to the monkey or the butterfly. If such an author, while adopting a zoological plan of arrangement, were to pass over the sections or families to which no medical interest attaches, the order that would result would be broken, incomplete, and unnatural—in fact, it would exist no longer. To this defect one may add that there are many animals distinct in their structure and their characters, placed by zoologists in different groups, often widely separated, which the physician must bring together and study in a collective manner, on account of the organs which they inhabit, the disorders which they occasion, or the agents with which they have to be repressed. Such are the Intestinal Parasites which are scattered in the classifications of the zoologist, but, united in the works of the physician."

Commencing with a short sketch of the human race, in which the physical characters of man and the unity of his species are briefly discussed, we find a section devoted to the organization of animals, and another reviewing the various systems of classification. The author next proceeds to the *Animals or Animal-Products employed in Medicine,* conveniently dividing them into three sections:—1. Those anciently used in medicine, but now obsolete. 2. Those whose use in medicine is rare; and, 3. Those, the employment of which is habitual. Under this last division are chapters on Liver Oils, Musky Products (Musk, Civet, Castoreum, Hyraceum, and Ambergris), Vesicant Insects, Leeches, Gallic Excrescences, and, lastly, Trehala. The 4th section treats of animal products whose use in medicine is accessory, such, for instance, as Bones, Gelatin, Albumen, Fats, Oils, Honey, &c. The succeeding divisions relate to the animals to whose attacks man is more or less liable. These are comprised under the following heads:—

Noxious Animals, not venomous and not parasitic.
Venomous Animals, or *Toxicozoa.*
External Parasites, or *Epizoa.*
Internal Parasites, or *Entozoa.*

Of the section *Epizoa living in the skin,* the first chapter is devoted to a minute and very interesting account of that common and repulsive parasite, whose attacks on the human body produce the symptoms known as *scabies.* As an example of the author's manner of handling his subject, we translate the introductory portion of this chapter:—

> "The itch-parasite, *Sarcoptes Scabiei,* Latr. (*Acarus Scabiei,* Linn., *A. Siro,* partim, Linn.) is an arachnid of the family *Acaridæ.*

"The history of this little animal is curious. Avenzoar, an Arabian physician of the 12th century, appears to be the first who observed in *scabies* a minute animal, *so minute as to be scarcely visible, and which, hidden beneath the epidermis, escapes from it when an aperture is made therein.* He designates it by the name of *Soab.* Rabelais mentions in two places the *Ciron de la gale.* He relates that one of the ancestors of Pantagruel, named Enay, was very expert at extracting these creatures from the hands. In another place he addresses to Panurgas the question—'*But whence comes this mite here between these two fingers?*' Ambrose Paré is still more explicit." This is how the father of surgery expresses himself:—

"'Les cirons sont de petits animaux tousiours cachez soubs le cuir, soubs lequel ils se traisnent, rampent et le rongent petit à petit, excitant une facheuse desmangeaison et grattelle.'

"Scaliger, Aldrovandus, Mouffett, and especially Cestoni and Wichmann, occupied themselves with the study of the insect in question. In spite of these respectable authorities and the tolerably accurate figures published in the *Acta Eruditorum*, in 1682, those by an anonymous author under the initials M. A. C. D., in 1726, and those by De Geer in 1778, many physicians not having succeeded in discovering the insect, regarded its existence as very problematical.

"In 1812, Galès de Belbèze, chief *pharmacien* to the Hôpital St. Louis, published a dissertation on *scabies*, in which he asserted that he had observed more than three hundred of the insects, all having the same form, but sometimes with eight legs, and sometimes with six, a difference which he attributed to sex. Galès does not describe the animal, but he figures it. The memoir of this young *pharmacien* was eagerly received, and the presence in *scabies* of an insect was again admitted, without opposition. The figure published by this author was reproduced in books for more than fifteen years as an exact representation of the itch-parasite. Unfortunately it differed notably from the creature described in earlier works. Doubts were soon raised, and things were examined more closely. Galès declared that he had found the animal in the pustules, where, however, *it never exists.* Alibert and Biett made numerous researches, but always with negative results. It was suspected that the author of the new dissertation had imposed on the learned and on the public. Finally, M. Raspail discovered that the insect figured was none other than—*the mite of cheese!*

"Incredulity returned, and soon the existence of an itch-insect was a second time denied. Mouronval published a dissertation, to establish as a fact that the cause of the disease is neither an insect nor a virus. This author had examined more than *eighteen hundred* persons afflicted with *scabies!* Finally a prize of 300 francs was offered by Dr. Lugol, as a challenge to any one who should show the insect.

"However, in 1834, François Renucci, a medical student, native of Corsica, clinical assistant to Professor Alibert, offered publicly to extract and exhibit the little animal that had been the object of so much controversy. The experiments were completely successful, and some of the students present succeeded themselves in isolating several of the insects. It was proved that the old writers were correct in asserting the reality of a special parasite producing *scabies*, and in this fact the opinion of physicians and zoologists has at length become completely settled.'

We cannot here follow our author through the dozen pages devoted to this curious subject, but we may and do strongly commend his entire work. It is replete with information, written in an agreeable style, and copiously illustrated with excellent woodcuts.

BOOKS RECEIVED.

On Chronic Alcoholic Intoxication; *or, Alcoholic Stimulants in Connexion with the Nervous System.* By W. Marcet, M.D., F.R.S., &c. London: John Churchill, New Burlington Street, 1859. (From the Author.)

The Chemistry of the Non-Metallic Elements and their Compounds: Air—Water—The Gases—The Acids; *and a Summary of Organic Chemistry, including a Comprehensive Course of Class Experiments.* By John Joseph Griffin, F.C.S. Illustrated by 440 engravings of Apparatus. London: John Joseph Griffin, Bunhill Row, and Richard Griffin & Co., Stationers' Hall Court, 1860.

A Manual of Pharmacy for the Student of Veterinary Medicine. By W. J. T. Morton. Sixth edition, corrected and enlarged. London: Longman, Green, Longman and Co., 1860. (From the Author.)

TO CORRESPONDENTS.

Robberies Committed on Wholesale Druggists.—We consider it a duty to call the attention of our members to the extensive robberies which have been committed of late in some of the wholesale drug houses in London. The principal articles stolen have been opium, saffron, quinine, and essential oils; but other and more bulky articles have also disappeared in some cases. It appears that the disposal of the products of such robberies is easily effected, and there is reason to fear that some retail druggists have been induced, by low and tempting prices, to purchase of strangers without due reflection and inquiry, which might have aided in the detection and punishment of the guilty parties. It is with the view of inducing greater caution in this respect, that we insert this notice.

Granular Citrate of Magnesia.—Mr. Bright, of 198, Oxford Street, states that the assertions made by Mr. Draper and Mr. Bastick, in reference to this preparation, are "quite incorrect, at least as far as applies to the citrate prepared by Mr. Bishop, and that prepared by myself." He also says: "Mr. Draper's method of granulation is not the one I adopt; for, although it may answer where the quantity required is small, yet, I think, if Mr. Bastick were called upon to make a batch of 56 lbs. or more, he would vote the process rather a bore."

W. G. (Bradford).—The subject is out of our province. We have no faith in the remedy alluded to.

A Young Chemist (London).—(1.) *Melissa Calamintha* is common calamint, and may be obtained under that name. *Melissa Citrina*, another name for *Melissa Officinalis*. (2). *Eau des Carmes.* Take of Spirit of the following: cinnamon, cloves, nutmeg, coriander, aniseed, citron, angelica, rosemary, marjoram, hyssop, thyme, sage, of each 113 parts; spirit of balm, 680 parts; distilled water, 340 parts; sugar, 56 parts. Mix and distil off the spirit.—*Pharmacopée Universelle.*

A. H. (Norwich).—There is no effectual method of purifying neatsfoot oil which has become rancid; if prepared from the fresh feet, the oil has no disagreeable smell.

A. P. S. (Bayswater).—There is no formula for simple Tincture of Iodine in the London Pharmacopœia. The Tincture of Iodine, of the Edinburgh College, is evidently intended in the case referred to.

A Correspondent (Kilmarnock) suggests, in order to curtail the business transacted on Sundays, that "sales be limited to necessary medicines." Our correspondent states, that as nine-tenths of the purchasers on a Sunday could have supplied themselves on the previous, or waited till the following, day, no injury would arise from the adoption of the plan suggested, and that it would enable a large proportion of those at present engaged on Sundays to be dispensed with.

W. G. (Oxford).—(1). The names "Sulphate of Quinine" and "Disulphate of Quinine," are synonymous. The "sulphate" of some chemists is the "disulphate" of others. (2.) Of course, as written, it means nitrate of mercury. (3.) It will be published at once in English. (4.) The works are entirely different in their objects, and cannot be compared; nor, if they could, would the question be one for us to answer.

Electrotype.—By distilling it away.

W. J. H. (Clare).—The question does not come within our province.

W. C. (Crewkerne), should write to the Secretary.

S. D. Juvenis.—Calcined Magnesia, made according to the Pharmacopœia, would resemble the light magnesia of commerce. This sort is, we believe, generally used in making Gregory's Powder.

G. M. E.—We know of no such preparation.

Dolleth.—(1.) See vol. xii. p. 392. (2.) See p. 399 of the present number, suet being substituted for lard.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. IX.—MARCH 1st, 1860.

PHARMACEUTICAL RESPONSIBILITIES AND REWARDS.

That the duties of the Pharmaceutist are of a very responsible nature cannot be denied. The man who enters the profession of Pharmacy is committed to a life of much anxiety and of unremitting study and toil. He is supposed to become a repository of all knowledge relating to the natural history, the commerce, the chemistry, the preparations, the properties, the doses, and the modes of administration of everything used in medicine. The Physician studies Materia Medica as a part of his professional qualification. He prescribes certain remedies, which, from his own experience or the representation of others, he has been induced to select from the multitude of those which are in use. His knowledge is ample with regard to these; it may be limited with regard to others. But not so the Pharmaceutist: his knowledge of Materia Medica is supposed to take a wider range, and to comprehend whatever is used by those even who avail themselves of new remedies. To whom should the Physician apply when he desires to try a new remedy, or to give a medicine in some new form? He expects to find in the Pharmaceutist an intelligent adviser, with whom he may confer on some practical points which are important in guiding his decision. He wishes to try a preparation of cerium or lithia, or one of the preparations of phosphate of iron, or to give the active principles of cinchona bark or opium, in as nearly as possible the same state of combination as that in which they exist in the crude drugs, but without the foreign matters with which they are there associated. What is oxalate of cerium, or carbonate of lithia, or syrup of phosphate of iron? Are there any suitable menstrua in which the first two of these could be given in solution? Is there any variation in the condition and appearance to which the last named remedy is subject, and if so, what is the cause of such variation? Is the phosphate of iron tribasic phosphate, or pyrophosphate, or mono-phosphate? What is the meaning of these terms, and what the difference between the phosphates named? Can kinate of quinine, or meconate of morphine, in a pure, or nearly pure, state, be readily isolated from the drugs containing them; and which of the known preparations of bark and opium present the nearest approximations to those compounds? These and other similar questions relating to the many hundreds of substances used in medicine, is the Pharmaceutist supposed to be able to answer. They are questions bearing upon his special department of science, and the appeal is naturally made to him on all such points.

Moreover, the Pharmaceutist is not only the repository of Pharmaceutical knowledge, from which the highly educated members of a learned profession, as well as the public, expect to be able to draw at their discretion; his establishment is a repository for the most powerful chemical agents committed to the use of man—most valuable when rightly applied, most dangerous in the hands of the ignorant and inexperienced. He moves about in a subdued atmosphere of poisons, and by the incautious or unskilful exercise of his duties may render the knowledge and skill of the Physician of no avail, or may even transform that which was designed to alleviate suffering and restore health, into a fatal instrument of death.

Who doubts that the profession of Pharmacy involves great responsibilities? The crude drugs from which medicines are prepared are partly the products of our own country, but to a greater extent they are brought from abroad, from every quarter of the globe. Many of them are derived from the vegetable kingdom, consisting of substances that do not admit of accurate analysis, and they are subject to great variations in quality and composition. They are often collected by ignorant persons, who being deceived themselves may impose the deception upon others. They sometimes pass through the hands of unprincipled dealers, by whom they are simulated or adulterated. Thus, the leaves of henbane and foxglove may be of the first instead of the second year's growth. The roots of dandelion may be mixed with those of other plants. The chamomiles may have the flowers of matricaria or pyrethrum among them. The corms of colchicum may have been collected at the wrong period of the year. So, in like manner, the Turkey or Indian rhubarb may be mixed with pieces of English production. The bark may be deficient in alkaloid. The opium may be the comparatively inefficacious Egyptian sort, or, if Turkey, it may be bad in quality. The scammony may have been adulterated to the extent of half its weight or more. The Pareira brava, while purporting to be the efficacious root, may consist entirely of worthless stem.

In cases such as these much technical and scientific knowledge are required to ensure the provision and supply of those agents upon the use of which the science and practice of medicine are based. To whom must the medical profession look for the substantial elements of that noble art which gives hope to the afflicted invalid, and relieves the anxious solicitude of those who surround the sick bed? Great abilities, great learning, long experience, minute and well directed observation of the phenomena of nature and the influence of art, in relation to health and disease, may have contributed their parts, and all that human wisdom can provide, or human wealth procure, may be expressed on that scrap of paper which the Physician leaves with his patient, and which is then committed to the Pharmaceutist. Is there no responsibility there? How often has the anxious eye of a devoted parent or dependent relative watched the turn of the balance which meted out the dose, and attempted to decipher the hieroglyphics upon the bottles from which the chosen remedies were taken? Let us hope that no tempting advertisement offered *that* colocynth at less than the market price; that Egyptian opium did not find its way into the laudanum as a substitute for the best Turkey opium; that the scammony was not bought at ten shillings a pound; that the hydrocyanic acid has not been kept until its strength has been diminished to one half. But no, there is no cheap physic here. If the man who made that laudanum, and prepared those extracts containing the concentrated virtues of hemlock and foxglove, knew how much his art was prized in the hour of need, how great the confidence reposed in his skill and integrity, how great the distance sometimes travelled, and how many shops with their blue and red bottles may have been passed in order to get the required medicine from his well-reputed stores, he would feel proud in the consciousness of his responsible position, and ever anxious to maintain the character and reputation for which he has laboured so long and with such unremitting attention.

The responsibility of the Pharmaceutist never ceases. By day and by night he is ever liable to be called upon, and ever ready to answer to the call. His life is one of constant anxiety. If he takes a respite from his daily toil, and seeks relief from the cares of business, he cannot divest himself of the sense of his responsibility. He knows not how often his presence may be required to satisfy the misgivings of those who honour him with their confidence. Then, if absent, who shall be left in charge of the bottles with "black drop" and "black draught," with "salicine" and "strychnine," with Ant. Tart. and Acid. Tart.? One fatal mistake may shake the confidence reposed in him, and destroy those fair prospects with which his past exertions have been rewarded.

In the performance of his duties, the Pharmaceutist is beset by many perplexing difficulties. A prescription may be presented ordering a preparation of which he has no knowledge. It is not in the Pharmacopœia, nor in any of the works of reference to which he has access. The prescriber, to whom reference would usually be made in such a case, may be unknown, or may live at too great a distance to admit of his being applied to. In another case, a mixture which he has prepared may present some slight difference in appearance from that which had been previously obtained elsewhere, and the patient is fearful there may have been some mistake. Many substances are used in medicine for which there are no authorized formulæ, and which are, therefore, made according to private or unrecognized forms, and sometimes there may be more than one formula for the same preparation, thus causing discrepancies which are frequent sources of difficulty and annoyance. New preparations are constantly being introduced, and names are sometimes applied to these which very imperfectly represent what they are, or do not clearly distinguish them from others. To meet cases of this description, it is necessary to be conversant with the medical and pharmaceutical literature of the day. There must, therefore, be no cessation in the professional studies of the Pharmaceutist. His life, as we have stated, is one of much anxiety and of unremitting study and toil.

The question very naturally arises here, what is the reward for the labour which involves so much technical and scientific knowledge, so much mental anxiety, and such close and constant application? In asking this question, the Pharmaceutist will probably be led into an examination of the extent to which the requirements for the efficient and satisfactory performance of the responsible duties referred to are provided, not only in his own case, but generally throughout the profession. The advantage derived by individuals from high professional qualification may sometimes be restricted by the want of qualification in the majority of those with whom such individuals are professionally associated. No doubt there are cases in which it is otherwise, and where a well qualified man may derive advantage from the fact of others in the same profession, by whom he is surrounded, being deficient in their qualifications; but it more frequently happens that the untried qualifications of the former are estimated by a reference to the proved deficiences of the latter. A man may be fully qualified for undertaking professional duties, and reaping professional rewards, from which he is shut out by the low estimate formed by the public of the general state of qualification in his profession. Thus, if it could be shown that Pharmaceutists generally were incapable of reading Latin prescriptions, the dispensing trade would soon be directed into a new channel, and although there might be individuals to whom the charge of want of qualification did not apply, these would nevertheless suffer in common with others, from the stigma which would attach to the body at large. The same may be said with regard to any other important qualification, and hence the claim which the body at large has upon individual members to abstain from any acts calculated to bring discredit upon the profession. On the other hand, it is equally obvious, that whatever tends to raise the profession of pharmacy in public estimation, to induce a belief that the members generally are fully equal to the responsibilities of their position, and capable of performing efficiently all the duties which devolve upon them, is calculated to increase the substantial rewards which may be reasonably looked for, and which it is hoped will ultimately be obtained.

DEGREES IN SCIENCE OF THE UNIVERSITY OF LONDON.

The Senate of the University of London have recently instituted the degrees of Bachelor and Doctor of Science, in accordance with representations which have been made to them by many of the most eminent scientific men in this country. These degrees are to be denoted by the letters B.Sc. and D.Sc. The degree of Bachelor of Science is to take rank with that of Bachelor of Arts

and, like the latter, is to be conferred after two consecutive examinations at an interval of a year from each other, and the first of which is to be preceded by a matriculation examination, such as candidates for the other degrees conferred by the University are required to pass before entering upon their special course of study. The subjects comprised in the first of the two examinations for the B.Sc. are, mathematics, mechanical and natural philosophy, chemistry, botany and vegetable physiology, and zoology and animal physiology. In the second examination, the subjects are nearly the same as in the first, but carried to a higher degree ; they are, mechanical and natural philosophy (excluding astronomy), geology and palæontology, and logic and moral philosophy. Bachelors of Arts of the University of London, and undergraduates who shall have passed the first examination for the degree of Bachelor of Medicine, are only required to pass the second B.Sc. examination.

For the degree of Doctor of Science, the candidate must have obtained the degree of B.Sc. two years previously, and must pass a satisfactory examination in one of the following branches of knowledge, to be selected by himself—viz.: Mathematics, mechanical science, astronomy, inorganic chemistry, organic chemistry, electricity, magnetism, physical optics, heat, acoustics, animal physiology, comparative anatomy, zoology, vegetable physiology, systematic botany, geology, palæontology, logic, and moral philosophy.

A BILL TO AMEND THE LAW RELATING TO THE UNLAWFUL ADMINISTERING OF POISON.

Prepared and brought in by Mr. Clive and Sir George Lewis, 21st Feb., 1860.

This Bill, which has been introduced by the Government, is intended to meet a class of cases, of which one or two have recently occurred, where poisonous substances are administered with the intention of doing some injury short of committing murder. It has been supposed by some of our Members to relate to the *sale of poisons*, but such, it will be found, is not the case.

Whereas the present Law has been found insufficient to protect persons from the unlawful administering of poison, except in cases where the intent is to commit murder : Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :

I. That whosoever shall unlawfully and maliciously administer to, or cause to be administered to, or taken by any other person, any poison or other destructive thing, so as thereby to endanger the life of such person, or so as thereby to inflict upon such person any grievous bodily harm, shall be guilty of felony, and, being convicted thereof, shall be liable to be sentenced to penal servitude for any period not exceeding ten years and not less than three years, or to imprisonment for any term not more than three years, with or without hard labour, at the discretion of the court.

II. Whoever shall unlawfully and maliciously administer to, or cause to be administered to, or taken by any other person, any poison or other destructive thing, with intent to injure, aggrieve, or annoy such person, shall be guilty of a misdemeanor, and, being convicted thereof, shall be liable to be sentenced to imprisonment for any period not exceeding three years, with or without hard labour, at the discretion of the court, and the costs and expenses of the prosecution of any such misdemeanor may be allowed by the court as in cases of felony.

III. If, upon the trial of any person charged with the felony above mentioned, the jury shall not be satisfied that such person is guilty thereof, but shall be satisfied that he is guilty of the misdemeanor above mentioned, then and in every such case the jury may acquit the accused of such felony, and find him guilty of such misdemeanor, and thereupon the delinquent shall be liable to be punished in the same manner as if convicted upon an indictment for the misdemeanor.

A Bill has also been introduced and read a second time in the House of Commons, for preventing the adulteration of articles of food and drink, a copy of which will be found in another part of this Journal.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, 1*st February*, 1860,

Present—Messrs. Bird, Bottle, Bucklee, Cupiss, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Haselden, Herring, Lescher, Meggeson, Morson, Sandford, Squire, and Waugh,

Mr. Thomas S. Hopwood, Richmond, Surrey, was elected a

MEMBER.

ELECTION OF THE COUNCIL.

The Lot having been taken, was declared to have fallen upon

Bird, William Lionel, 42, Castle Street, Oxford Street
Edwards, George, Dartford
Hanbury, Daniel Bell, Plough Court, Lombard Street
Haselden, Adolphus F., 18, Conduit Street, Regent Street
Lescher, Joseph Sidney, 60, Bartholomew Close
Meggeson, George, 61, Cannon Street, City
Sandford, George Webb, 47, Piccadilly

The following Members of the Society were elected Trustees for the Bell Memorial Scholarship Fund:—

George Waugh, 177, Regent Street
Daniel Hanbury, of the Firm of Allen & Hanburys, Plough Court, Lombard Street.
Thomas Hyde Hills, of the Firm of J. Bell & Co., 338, Oxford Street

SPECIAL MEETING OF THE COUNCIL, 20*th February*,

Present—Messrs. Bird, Brew, Bucklee, Cupiss, J. B. Edwards, Haselden, Herring, Lescher, Meggeson, Morson, Sandford, Squire, and Waugh.

A Committee was appointed to make the necessary preliminary arrangements for constructing a commodious and efficient range of Laboratories on the upper floor of the Society's premises.

MAJOR EXAMINATION, 21*st February*.

Delves, George .....Tunbridge Wells
Powers, Edward.....Stourbridge

MINOR EXAMINATION.

Dickins, Benjamin .....Stratford-on-Avon
Frost, George.....Derby
Hardy, Samuel Croft .....Birmingham
Underdown, Frederick W. .....Canterbury
Watson, Frederick.....Fakenham

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Bowen, John Thomas	Mr. Parker	Bath
Boyd, John	Mr. Cornish	Brighton
Braggs, Robert William	Mr. Anness	Ipswich
Fancourt, John	Mr. Lavers	Blackheath
Martindale, William	Mr. Thompson	Carlisle
Rose, Alfred	Mr. Dakin	73, King William St., City
Saul, William Benjamin	Mr. Pring	Taunton
Sproat, Robert	Mr. Parker	Derby

FREE ADMISSIONS TO THE ROYAL BOTANIC SOCIETY'S GARDENS, REGENT'S PARK.

The following pupils of the class of Materia Medica and Botany having passed an examination in Elementary Botany, have been recommended by Professor Bentley to Mr. Sowerby for free admission to the Royal Botanic Society's Gardens:—

Mr. Wm. Hy. Bell
— John Bourdas
— T. S. Crowe
— H. Denne
— G. F. Gilbert
— T. H. Hall
— W. Hickman
— E. M. Holmes
Mr. Frank Hooper
— Jas. Norrish
— Hy. Long
— F. Pertwee
— S. W. Smyth
— Chas. Symes
— J. M. Wheeler.

The orders thus granted by Mr. Sowerby admit the Students to the Gardens upon ordinary days, in the months of March, April, and August, from 9 A.M. till 1 P.M.; and in May, June, and July, from 7 A.M. till 1 P.M. Such admissions, therefore, give every facility to those who possess them to make themselves practically acquainted with plants.

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL — (*Continued*).

Amount previously advertised, £1664 10*s.* 6*d.*

	£	s.	d.
Argles, Son, and Stonham, Maidstone	5	5	0
Bevan, Charles F., Harwich	0	10	6
Clift, Edward, Lewisham	1	1	0
Coles, Charles, 72, Euston Square	1	1	0
Davies, H., Newport, Monmouth	0	10	6
Evans, Evan, Aberavon	0	10	6
Foster, Alfred Hood, Birmingham	0	10	6
Green, J., West Bromwich	1	0	0
Hudson, William B., 27, Haymarket	5	5	0
Hutchins, William, 25, Hanover Square	1	1	0
Kinch, Mrs., Henley-on-Thames	1	1	0
Lavers, Thomas Howard, Blackheath	1	1	0
Metcalfe, John Sykes, Preston	0	5	0
Rastrick, John Alfred, Woolwich	1	1	0
Rouse, J., M.R.C.S., 56, Maddox Street	1	1	0
Sandliand, Robert B., Bicester	1	1	0
Simpson, Henry David, Louth	0	10	6
Smith, Albert, North End Lodge, Fulham	1	1	0
Smith, Arthur	1	1	0
Tippett, Benjamin M., 3, Sloane Street	1	1	0
Wilson, Erasmus, F.R.C.S., F.R.S., 17, Henrietta Street	1	1	0

PHARMACEUTICAL MEETING.

Wednesday, February 1st, 1860.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced:—

Journal of the Society of Arts. From the Society of Arts.
Photographic Journal. From the Photographic Society.
The Dentist. From the Editor.
Chemical News. From the Editor.

List of Fellows, Members, &c. From the College of Physicians.
A Specimen of Narcotine. From Mr. J. Schweitzer.
Specimen of Crystallized Carbonate of Soda. From Mr. Augustus Bird.
Specimens of Articles of the Brazilian Materia Medica. From Messrs. Jenkin and Phillips.

NOTE ON THE ROMAN CHAMOMILE (*ANTHEMIS NOBILIS*).

BY PROFESSOR BENTLEY, M.R.C.S., F.L.S.

In a recent number of the *Journal de Chimie Médicale*, and in other French and German periodicals, a note has appeared on the Roman Chamomile by M. Timbal-Lagrave, in which he states that under that name he has had supplied to him the flowers of three different plants, which, although allied in their botanical and medicinal properties, ought not to be substituted for one another. The three plants from which were derived the flowers thus furnished to M. Timbal-Lagrave as Roman Chamomiles were as follows :—

1st. *Anthemis nobilis* (L.).

2nd. *Chrysanthemum Parthenium* (Pers.), the *Matricaria Parthenium* (L.), and the *Pyrethrum Parthenium* (Smith).

3rd. *Matricaria parthenioides* (Desf.), the *Anthemis parthenioides* (Bernh.), and the *Anthemis apiifolia* (R. Br.).

These plants all belong to the Nat. Ord. Compositæ, Sub-Order Corymbiferæ.

M. Timbal-Lagrave then proceeds to show that the flowers of the above plants are difficult to distinguish from one another upon a superficial examination, especially when we have to deal with those which are used commercially, as they have been derived from cultivated plants, and have consequently undergone various modifications from the conditions in which they existed in a wild state. He then states that the flowers of *Anthemis nobilis* may be readily distinguished from those of *Matricaria Parthenium* and *Matricaria parthenioides* when more particularly examined, and gives the distinctive characters of the three flowers as found in commerce. According to M. Timbal-Lagrave, the flowers of *Matricaria Parthenium* and *M. parthenioides* resemble each other so closely, that in their commercial state they cannot be distinguished, and hence they are both known from those of *Anthemis nobilis* by similar distinctive characters.

It was my original object to have translated the above note of M. Timbal-Lagrave for publication in the *Pharmaceutical Journal*, but upon examining the flowers of the cultivated *Matricaria Parthenium*, Double Feverfew, now extensively grown in our gardens, and which were kindly supplied to me by Mr. Hanbury, I found that they varied in some particulars from those described by M. Timbal-Lagrave, and, therefore, I have thought it more desirable to write a separate note upon the subject, and, at the same time, to refer shortly to the flowers of some allied plants, which are also liable to be confounded with those of the *Anthemis nobilis*. It is not my intention to describe them in a strictly botanical way, but principally to allude to their more prominent characters—those by which they can be readily distinguished, even by pharmaceutists who possess but a limited botanical knowledge.

The name of Roman Chamomiles was originally applied on the Continent, to the flowers of *Anthemis nobilis*, to distinguish them from those of *Matricaria Chamomilla*, which are there commonly known as Common Chamomiles. The former are the True or Officinal Chamomiles of our Pharmacopœias; the latter are in common use in Germany and some other parts of the Continent.

The flowers most likely to be confounded with those of *Anthemis nobilis* in this country are, 1st, those of *Matricaria Chamomilla*, and 2nd, those of *Matricaria Parthenium*. To these, therefore, our attention will be alone directed in this note, but the characters which will be given of the flowers of the above plants will enable any one not only to distinguish them from each other, but also at the same time from those of other plants with which they are likely to be

confounded. (With regard to the flowers of the *Matricaria parthenioides*, as mentioned by M. Timbal-Lagrave, but little appears to be known in this country either in a double or single state.) We shall first describe briefly the distinctive characters of the single flowers (*flores simplices*) of the three plants mentioned above, and then proceed to allude to the double ones (*flores pleni*).

Anthemis nobilis (L.), True Chamomile, with single flowers (*flores anthemidis simplices*). These have a strong, peculiar, and pleasantly aromatic odour; the *involucre* is hemispherical, and composed of nearly equal leaves called *bracts* or *phyllaries*, which are broadly membranous at their margins; the *receptacle* is conical in shape, solid, and abundantly provided with thin, concave, obtuse or blunt-pointed, entirely membranous or chaffy-looking scales.

Matricaria Chamomilla (L.), Common or Wild Chamomile, with single flowers. These have an odour somewhat resembling those of *Anthemis nobilis*, but much fainter, and less pleasantly aromatic; the *involucre* is nearly flat, and composed of nearly equal leaves or bracts, which are obtuse-pointed, and not distinctly membranous at their margins; the *receptacle* is naked—that is, without any scales, hollow, and broadly conical or nearly cylindrical in shape.

Matricaria Parthenium (L.), Feverfew, with single flowers. These have a strong, peculiar, unpleasant odour; the *involucre* is convex, and composed of nearly equal leaves or bracts, which are membranous at their margins; the *receptacle* has no scales upon its surface, and is slightly convex in shape, or nearly flat.

From the characters thus given of the single flowers of the above plants, it will be noticed that those of *Anthemis nobilis* may be at once distinguished from those of *Matricaria Chamomilla* and *M. Parthenium* by their peculiar and pleasantly aromatic odour, and their scaly receptacle; from those of *Matricaria Chamomilla* they are further distinguished by the component bracts of the involucre being broadly and evidently membranous at their margins, and by their solid, narrower, and more pointed receptacle; and from those of *Matricaria Parthenium* they are also further known by their conical receptacle.

We now proceed to describe the flowers of the above three plants as obtained from cultivated specimens, namely, those in which the yellow tubular florets of the disk or centre of the heads or capitula of the single flowers, have been entirely or partially converted into nearly white ligulate or strap-shaped ones. Such flowers are said to be double (*flores pleni*). We are, however, unacquainted with double flowers of the *Matricaria Chamomilla*, as that plant is not commonly cultivated in this country. Our attention is therefore necessarily confined to those of *Anthemis nobilis* and *Matricaria Parthenium*. It is most probable, however, that, even could a double variety of *Matricaria Chamomilla* be obtained, it would differ but slightly in its characters from those which it presents in a single state as described above, and hence one or more of those characters would suffice to distinguish its double flowers from those of *Anthemis nobilis*.

Anthemis nobilis (L.). The true, officinal, or Roman Chamomile, with double flowers (*flores anthemidis pleni*). In these, the floral heads (*capitula*) are generally entirely composed of whitish ligulate florets, except quite in their centre, where may be commonly observed a few small tubular ones. They have a peculiar, pleasant, and aromatic odour, although this is less powerful than that of the single flowers; the *involucre* is nearly flat, and composed of a number of spreading, nearly equal, overlapping bracts, with broadly and evidently membranous margins; when the florets are removed, the *receptacle* is observed to be closely covered with a number of thin, concave, membranous or chaffy-looking, blunt-pointed or obtuse scales, the whole forming within the involucre, and rising above it, a broadly conical body; the *receptacle* is conical in shape, more or less pointed at the apex, and solid.

Matricaria Parthenium (L.), Feverfew, with double flowers (*flores parthenii pleni*). In these, the heads or capitula, have a number of the yellow tubular florets of the disk as seen in the single flowers, converted into whitish ligulate

ones, but in the centre there are always to be noticed many enlarged tubular florets; they may be described as generally less double than those of *Anthemis nobilis*. The odour is strong, peculiar, and more or less unpleasant; the *involucre* is convex, and composed of a number of nearly equal, imbricated, concave bracts, which are bent inwards above, and each having a prominent rib on its dorsal surface; upon removing the florets a number of scales may be noticed situated on the receptacle, these are lanceolate in form, acute-pointed, and less membranous in their nature than those of *Anthemis nobilis;* the *receptacle* is convex or nearly flat, and forms, together with the scales arising from it, a flattened top or head.

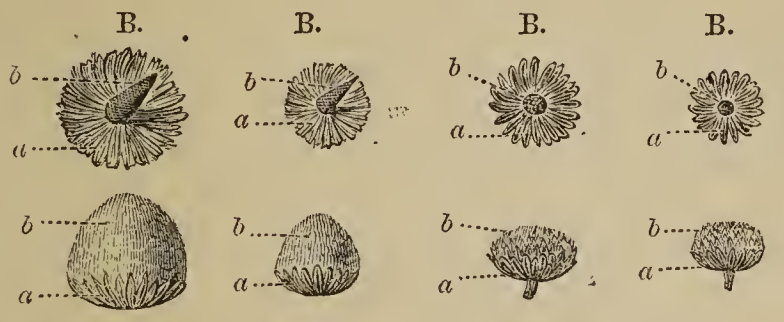


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Fig. 1. Large Double Chamomile Flowers.

A. The capitulum with the florets removed. *a.* involucre; *b.* scales on the receptacle, and forming with it a broadly conical top or head.

B. The same with the scales and florets removed, to show the conical receptacle *b.* upon which the scales are placed; *a.* involucre.

Fig. 2. Small Double Chamomile Flowers.

A. and B. The letters refer to the same parts as in figure 1, A. and B.

Fig. 3. Large Double Feverfew Flowers.

A. The capitulum with the florets removed. *a.* involucre; *b.* scales arising from the receptacle, and forming with it a flattened top or head.

B. The same, with the scales and florets removed, to show that the receptacle *b.* is very short and slightly convex; *a.* involucre.

Fig. 4. Small Double Feverfew Flowers.

A. and B. The letters refer to the same parts as in figure 3, A. and B.

N.B.—The flowers are all drawn of their natural size.

The presence of these scales upon the surface of the receptacle in the double flowers of *Matricaria Parthenium* is very remarkable, and require to be particularly noted, as such are not present in the single flowers of the same plant in an uncultivated state. They are accordingly an irregular development produced by cultivation, and appear to arise from an increase in the number of the bracts of the involucre, as they closely resemble these in appearance, except those that are situated quite in the centre of the receptacle, which are more membranous in their nature. These scales have been especially alluded to by M. Timbal-Lagrave in the paper mentioned above. It should be particularly noticed, that in works on Materia Medica it is commonly stated, that the flowers of *Anthemis nobilis* may be at once distinguished from those of *Matricaria Parthenium* by the presence of scales, as such organs are absent in the flowers of the latter plant. This supposed universal distinctive character between them has now been shown, as described above, to apply only to the single flowers of the two plants.

When we review the characters, as given above, of the double flowers of *Anthemis nobilis* and *Matricaria Parthenium*, we find that, upon a superficial examination of the two, they might be easily confounded with each other, but upon a more careful investigation we observe certain well-marked distinctive characters, the more important of which are the following:—

1st. The different odours of the two.

2nd. The *receptacle* of *Anthemis nobilis* is conical, and more or less pointed at

its apex; while that of *Matricaria Parthenium* is nearly flat or but slightly convex, and rounded above.

3rd. The *scales* on the receptacle of *Anthemis nobilis* are more numerous, more closely compacted, and more membranous in their nature than those of *Matricaria Parthenium*.

Finally, we may state that Double Chamomile flowers may be at once distinguished from Double Feverfew flowers, when the florets have been removed, by the different appearances then presented by their respective centres—thus that of *Anthemis nobilis* is broadly conical, and densely scaly; that of the *Matricaria Parthenium* almost flat, with fewer scales, and these less membranous in their nature.

Mr. Daniel Hanbury thought the resemblance between the true chamomile flowers and those of *Matricaria Parthenium*, was such that purchasers might easily be deceived when some of the latter were mixed with the former.

ON THE ALLEGED PRESENCE OF ARSENIC AND ANTIMONY IN GREY POWDER.

BY PROFESSOR REDWOOD.

A statement was made by one of the witnesses at the trial of Dr. Smethurst, in August, of last year, to the effect that arsenic and antimony were sometimes present in grey powder; and this was followed by a communication which appeared in the *Medical Times and Gazette*, of the 3rd of September, from Mr. S. R. Pittard, of 21, Hans Place, of which the following is an extract:—

"Nobody who knows Dr. Thudichum can ever doubt his veracity in a matter of fact. At Dr. Smethurst's trial he stated that he had found arsenic and antimony, and other abnormal ingredients, in grey powder. Are these frequently present in the grey powder commonly sold in London? In reply to this I beg to state that for several years before I gave up practice (four years ago) I had abandoned the use of grey powder entirely, because I found that it invariably made the patients who took it sick. I tried numerous samples, bought of various druggists, but they all alike produced vomiting. This used not to be an effect of the grey powder of former days, and last winter a friend gave me some manufactured by himself, which I used in the illness of some of my children, and it did not make them sick.

"My friend Mr. Steet, of Myddelton-square, without my having communicated the above to him, informed me that he also had found that all the grey powder which he bought produced vomiting, and that therefore he manufactures it himself.

"This goes far to show that antimony and arsenic—one, or both—are often present in ordinary grey powder. I have learnt from a person who has often been employed by manufacturing druggists, how, most probably, they get there. The mercury used to make grey powder, &c., is often the refuse of the silvering of looking-glasses—sold at about eightpence the pound. The mercury is used in this silvering process in conjunction with a foil,—said to be tin-foil, but really consisting of tin, lead, arsenic, and antimony,—which is dissolved by, and forms an amalgam with, the mercury. The mercury is used in great excess, and the surplus is rapidly squeezed out by pressure. It may be used over and over again several times, but at length it becomes thick (no longer quite fluid), and then it is no longer usable in the process. The thickness is of course due to the foil dissolved in it. My informant tells me that it is often used for making hyd. c. creta thick as received from the looking-glass makers; but it is manifest that even if it were distilled off the tin and lead, the arsenic and antimony, being volatile, would pass over with it."

These statements created much surprise, and although the evidence adduced was by no means sufficient to prove the case attempted to be made out the allegations were calculated to shake the confidence of medical men in the use of a remedy which, up to that time, had been considered to be a safe and mild preparation of mercury—one, moreover, which was frequently given to children. Some further investigation was required, either to confirm or to refute the

allegations, and with this object I procured several samples of grey powder from different sources, and submitted them to very careful examination. The result has been that in no case have I been able to detect even a trace of either arsenic or antimony in any one sample. In conducting the examination, several methods of analysis were adopted, but all with the same negative result.

1. One hundred grains of the powder were treated with pure diluted hydrochloric acid, until the whole of the chalk was dissolved, and then the further action of the acid was aided by the addition of chlorate of potash, until all the mercury disappeared. This was done in a stoppered bottle the mouth of which was closed during the latter part of the process, and, by agitation, the solution of the mercury was thus quickly and easily effected with only a small quantity of the chlorate. To the solution, hyposulphite of soda was added and heat applied for some time. Sulphuretted hydrogen was then passed through, in the usual way, and after complete precipitation of all that could be thrown down, the sulphide was collected, digested in sulphide of ammonium, and the solution examined for arsenic and antimony.

2. The foregoing process was varied by the substitution of nitric acid for hydrochloric acid and chlorate of potash.

3. One hundred grains of the powder were dissolved in pure concentrated hydrochloric acid, aided by the addition of chlorate of potash, and the solution thus formed was distilled to dryness. The distillate was tested for arsenic with a Marsh's apparatus.

4. One hundred grains of the powder were treated with pure diluted hydrochloric acid, until the whole of the chalk was dissolved, and a little acid left in excess. A gentle heat was now applied, and the solution afterwards filtered. This solution was examined in the usual way, with a Marsh's apparatus. It was found that the solution thus formed always contained a little mercury, and the process was therefore modified in the following way: The hydrochloric acid solution was nearly neutralized with potash, the quantity of free acid left being insufficient to generate hydrogen gas when pieces of bright metallic zinc were put into it. Some pieces of zinc were then immersed in it, and allowed to remain in for twelve hours. The mercury was deposited on the zinc, and would have carried any arsenic with it, if present. These pieces of amalgamated zinc were put into a Marsh's apparatus, and tested in the usual way, other pieces of unamalgamated zinc being used for generating the hydrogen.

5. One hundred grains of the powder were treated with pure diluted acetic acid, until the whole of the chalk was dissolved; the remaining mercury was then digested in more acid with heat, and the solutions filtered and evaporated nearly to dryness. This residue was dissolved in water, and, being only slightly acid, pieces of bright metallic zinc were immersed in it for twelve hours. These were afterwards removed, and used with Marsh's apparatus, as in the preceding process.

After repeated trials, it was found that either of the three last described processes was capable of detecting very minute quantities of arsenic when added to grey powder. The one thousandth of a grain of arsenious acid was thus easily detected when added to one hundred grains of the powder, and a similar result was obtained when the arsenic was added in the metallic state, and rubbed with the powder. In fact, the precipitated mercury upon the surface of the zinc in processes 4 and 5, at once indicated the presence of the arsenic. It is only when perfectly free from arsenic that the mercury is deposited with the usual brilliant appearance of the amalgam of zinc and mercury. When the one thousandth of a grain of arsenious acid has been added to a solution containing five grains of corrosive sublimate, with two or three drops of hydrochloric acid, and a piece of bright metallic zinc is immersed in it, the deposit formed has a dull greyish appearance, quite different from that of the coating formed when the arsenic is absent. The one hundredth of a grain of arsenious acid gives a coating which is quite devoid of metallic lustre; and

the tenth of a grain gives a dark brown, nearly black, pulverulent coating. The pieces of zinc thus coated, on being put into Marsh's apparatus, in the manner indicated, at once give the metallic stain characteristic of arsenic.

The samples of grey powder which I have submitted to examination were obtained partly from wholesale and partly from retail houses. Four samples were the manufacture of four of the principal wholesale makers in London, and two other samples were obtained from retail houses.

As already stated, no evidence of the presence of either arsenic or antimony could be obtained from any one of these samples. I believe the samples fairly represented the grey powder as met with in commerce and used in medicine, and the result of the examination of them has been to confirm the opinion I previously entertained, that grey powder is not subject to the contamination referred to, and that if any instance of such a contamination has occurred, it must have been an exceptional case.

The explanation which Mr. Pittard offers of the manner in which arsenic and antimony, as he supposes, find their way into grey powder, is, I believe, altogether founded in error, but his statement that the medicinal action of grey powder, as now frequently met with in commerce, is different from that of the grey powder formerly used, accords with what I have heard from other sources. On more than one occasion I have been applied to by manufacturers on the large scale of grey powder, for an explanation of the probable cause of a complaint made against their grey powder, to the effect that it caused sickness and griping when administered to children. In these cases I have found that the mercury and chalk were mixed together, not, as formerly, by rubbing them in a mortar by manual labour, but by putting them into a cask or other similar vessel with a central shaft passing through it, and causing the vessel to rotate on its axis by attaching it to a steam-engine. In this way a rapid motion being kept up for a great length of time, the mercury is subjected to conditions favourable to its oxidation, and we should naturally expect under such circumstances that the product would contain more oxide of mercury than exists in the grey powder made by manual labour.

In the examination of the specimens I have already referred to, I have satisfied myself that there is a great difference in the quantity of oxide contained in different specimens. One specimen which had been prepared with great care by trituration in a mortar, yielded only 0.64 of a grain of oxide from 100 grains, while another specimen which had been made by machinery, yielded no less than 15.8 grains from the same quantity. On boiling 100 grains of the latter specimen with acetic acid, and allowing the solution to cool after filtration, acetate of mercury crystallized out in abundance. This specimen was one which had been in stock for many years, and it is a question, therefore, whether the large quantity of oxide present in it is to be ascribed in any degree to long exposure to the air. I purpose making a more extended series of determinations of the quantity of oxide contained in different specimens of grey powder, the results of which will be communicated hereafter.

The Chairman said it was quite true that a certain quantity of mercury was recovered from old and broken looking-glasses, the amalgam being scraped off the glass and submitted to distillation. He thought this was probably what led to the statement made by Mr. Pittard; but it would not justify his conclusion, as the mercury so obtained was unexceptionable in regard to purity. The difference in the effects of grey powder were much more likely to arise from the presence of variable quantities of oxide of mercury.

Dr. Andrew Clark said his own profession, as well as that of pharmacy, were indebted to Dr. Redwood for the examination he had undertaken, as much injury was done by rash statements such as those to which reference had been made. Being connected with one of the large Metropolitan Hospitals, and being in the habit of ordering *hydrargyrum cum creta*, sometimes to two or three

hundred patients in a week, he could say, as the result of his experience, that it was a safe and valuable medicine, and he had never observed any bad effects to result from its use. The points referred to by Dr. Redwood, relating to the quantity of oxide of mercury contained in grey powder, and the influence of the application of steam power in making it, were very important, and he hoped he would continue the experiments he had commenced, so as to clear up that part of the subject.

Mr. WHIPPLE confirmed the statement which had been made with reference to the way in which grey powder is made on the large scale.

Mr. CUPISS said *hydrargyrum cum creta* was much used in his neighbourhood, and he had never heard of any ill effects being produced by it.

PHARMACEUTICAL MEETING, EDINBURGH.

A MEETING of the Pharmaceutical Society was held in 51, George Street, on the evening of 31st January, at nine o'clock;

MR. RAINES, PRESIDENT, IN THE CHAIR.

Dr. ROBERT FERGUSON gave an excellent address on Electricity, giving an account of the different machines from the earliest times. He illustrated his remarks with various experiments, all of which were interesting and very successful. In concluding, he referred especially to Winter's machine, and, having one in operation, he described it to the meeting, and showed the great power it possessed compared with any ordinary electrifying apparatus.

A vote of thanks to Dr. Ferguson, proposed by the Chairman, was carried by acclamation.

Mr. CROSSLY, an Associate of the Society, read a paper on Chloroform.

A vote of thanks having been proposed and unanimously carried, the meeting adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

THE Ninth Meeting of the Session was held in the Royal Institution, Colquitt Street, Feb. 2, 1860;

MR. DUTTON, THE VICE-PRESIDENT, IN THE CHAIR.

Mr. Ridley was elected an Associate.

Mr. E. CLAPHAM read a paper "On Green Copperas: its Manufacture, and Application in the Arts and Sciences." The Author gave a general outline of the production of iron from its ores, after which he noticed the various preparations of that metal, particularly the sulphate, and the important uses to which it is applied, especially in reference to dyeing and calico printing, &c.

Mr. REID gave a descriptive and interesting explanation of the uses of an instrument termed "the carbon test," of which he is the inventor. The instrument consists of a glass globe or bulb with two necks, one from each of two opposite sides, with flexible tubing and self-inflating ball. The experiments made with the instrument were as follows:—1. The globe was charged with a solution of lime, and the ball charged with fresh air, which was passed through the solution, the appearance of which remained unaltered. 2. The globe remained charged as before, and the ball was filled with air from the human lungs, which was passed through the same globe also charged with solution of lime. The solution became quite turbid and milky, from the carbonic acid contained in the expired breath, combining with lime in solution, and forming carbonate of lime. 3. The air from a room was passed through the globe, charged as before, and the appearance of the solution was changed in proportion to the degree to which the atmosphere of the room became fouled from carbonic acid. The instrument appears to be well adapted for testing the comparative purity of the air in large establishments, such as schools, hospitals, workshops, mills, &c., where the products of combustion, whether arising from the lungs or from the burning of gas, are quickly indicated.

A vote of thanks to Mr. Clapham and Mr. Reid terminated the proceedings.

Royal Institution.

The Tenth Meeting of the Session was held on Feb. 16, 1860;

THE PRESIDENT IN THE CHAIR.

Mr. Arnott exhibited a specimen of silver ore from the Sierra Nevada, California, stating that 1lb. of ore yielded 1 oz. of silver. A vein of this ore, extending a distance of thirty miles, and upwards of thirty feet thick in many places, had been discovered, and it was thought that, taking into consideration the large quantities of quicksilver found there, the discovery of this immense amount of silver would not be second in importance to the discovery of gold in that region.

Dr. Collingwood delivered the first part of a lecture on Invertebrate Zoology, "On the General Structure of Molluscous Animals." The lecture, which was illustrated by a large number of well-executed drawings, conveyed a considerable amount of information upon this interesting topic, and the lucid explanations and pertinent observations of Dr. Collingwood were listened to with marked attention, a cordial vote of thanks being accorded on the termination of his lecture.

A report of the proceedings at the Conversazione, held February 21st, will be given in next number of the Journal.

ORIGINAL AND EXTRACTED ARTICLES.

THE DESCRIPTION, COMPOSITION, AND PREPARATIONS OF THE SANGUINARIA CANADENSIS.

BY GEORGE D. GIBB, M.D., M.R.C.P., LONDON.

In another place* I have been at some pains to show the value of the sanguinaria, or Canadian blood-root, in many internal diseases, of which those of the chest and throat are the most important. From the evidence which has been brought forward to prove its value in these, there is no doubt that the drug will become extensively employed in this country. The pages of the *Pharmaceutical Journal* have appeared to me the fittest place for a description of the root, its composition, and of the various preparations employed medicinally.

The plant belongs to the sexual system Polyandria Monogynia, and the natural order Papaveraceæ.

DESCRIPTION.

The only officinal part of this hardy little herbaceous perennial plant is the root.

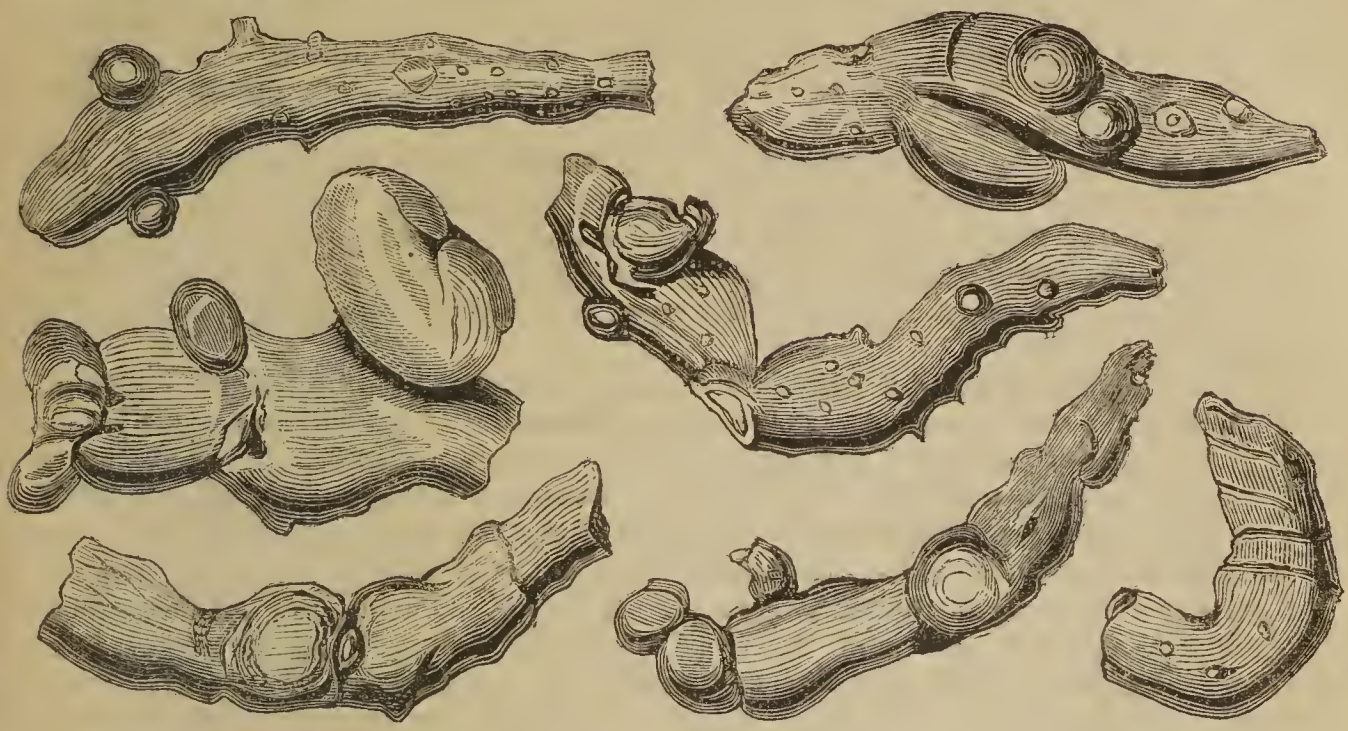
The Root.—When *fresh*, it is from two to three and a half and four inches long, abrupt at the end, often contorted and truncated, about as thick as the finger, fleshy, round, being for the most part tolerably stout in the middle, with a curvature at each end, covered with orange fibres two or more inches long, of a reddish brown colour externally, inclining to copper, of a brighter blood-red within, and abounding in an orange-coloured juice, which escapes when it is cut. The end always has the appearance of having been cut off by a dull instrument, or broken in removing it from the ground. Occasionally a number of roots are connected together, principally by no closer attachment than that produced by a fasciculation of numerous fibres originating from the main body.

When *dried*, it has considerably shrunken; and, as met with in commerce, is in pieces from one to three inches long,† from a quarter to half an inch or more in thickness, flattened, heavy, much wrinkled and twisted, often furnished with abrupt offsets or knobs and many short radical fibres, externally a darker reddish-brown colour, with a spongy, uneven fracture when broken, the surface of which is at first bright orange, deepest in the centre, but becomes of a dull brown by long exposure.

* See *British Medical Journal*, page 104.

† A few reach the length of four inches.

The form and dimensions of the dried root, as usually met with, are represented in the woodcuts.



There is but the one kind only of blood-root employed in commerce, and it is met with unadulterated, there being no inducement to practise fraud, from its cheapness and abundant growth. A few extraneous but unimportant matters are sometimes found with the dried roots. Two packages of the dried root sent me by my friend Dr. Fenwick, obtained from Lyman, Savage, and Co., druggists, of Montreal, contained eight pounds each, and were put up in oblong deal boxes, with a sliding lid, and were perfectly air-tight.

The odour of the root is peculiar and somewhat narcotic, and on handling it, causes sneezing; the taste is bitterish, acrid, and durable. The sneezing effect is also produced by stirring the powder. It yields its virtues to water and alcohol, and these will be found to be the greatest when the seeds are ripe, about the months of May and June, which are the best time to collect the plant for medicinal purposes. The virtues of the root are said to be rapidly deteriorated by time; some difference of opinion, however, exists on this point.

The *powdered root* possesses a brighter brownish orange-red colour than powdered cinnamon, and otherwise resembles it.

The *seeds* are about the size of grains of barley, of a dark shiny reddish brown colour, half surrounded with a peculiar white vermiform appendage, which projects at the lower end. Like most other seeds of the poppy tribe, the albumen of the seeds of this plant is between fleshy and oily. A bland and nutritious colourless fixed oil is obtained from the seeds, which, as already mentioned, ripen in the months of May and June, or even much earlier in the southern states of America.

The *juice* of the plant, generally of an orange colour, sometimes assumes the tint and redness of blood, especially in the northern parts of Canada. That obtained from the leaves is of a lighter tint. Both stain a deep orange yellow, and hence its use as a dye, as described in the economical uses of the plant further on.

The juice, when examined under the *microscope,* presents numerous transparent globules, like those represented in milk, and multitudes of coloured granules, free and in clusters; this is at 300 diameters. With a higher power than this, the likeness to the globules of milk is even more distinct, as they are varied in size, and are equally as numerous as in rich milk. With a still higher power of 740 diameters, the fluid is seen to be in a state of life, as multitudes of

transparent monads, moving to and fro, give the most active appearance to all the objects on the field, a peculiarity I have only observed in freshly drawn milk taken from the female breast, which has undergone saccharine fermentation within the gland. Many of the globules of the juice filled cells, which contained as many as fifteen or twenty, thus resembling a compound granular corpuscle.

The greater part of the globules and granules were dissolved by ether, and rendered thinner and more transparent by liquor potassæ. Acetic acid dissolved a good deal of the granular matter. The action of a number of reagents, such as the acids, ammonia, &c., did not produce any of the salts of sanguinarina, although the condition of the peculiar resin was slightly altered in its molecular cohesion.

A horizontal section of the fresh root is probably one of the most beautiful objects under the microscope to be met with in the whole vegetable kingdom. It is found to consist of a multitude of cells of more or less uniform diameter throughout its central part, of a somewhat oval and hexagonal form, and filled with three different substances. The first of these is the orange-coloured resin peculiar to the plant, which occupies the larger proportion of the cells, presenting the most beautiful shades of transparent amber. The second is a substance, occupying the cells here and there, of a magnificent transparent garnet hue, resembling dots of true garnet scattered over the field, with lateral facets, like a precious stone: this is probably the most remarkable peculiarity connected with this wonderful plant, and I believe these garnet bodies to represent the sanguinarina; whilst the third substance is white and transparent, occupying even fewer cells than the last named, but consisting of a colourless fixed oil, peculiar to the plant itself.

COMPOSITION.

The root, the leaves, and the seeds have been submitted to chemical analysis by several American physicians; these, however, were not complete, and did not all agree with one another.

Dr. Downey, of Maryland, who wrote an inaugural dissertation upon it in 1803, considered the proximate principles of the plant to be *resin*, *gum*, and an *extractive* or *saponaceous matter*, the gum being the greatest in quantity, and containing the active principle of the plant. Dr. Bigelow, on the other hand, who examined the root chemically in 1816, found neither gum nor extract present, but a *peculiar resin* of a deep orange colour, a *bitter principle*, an *acrid principle* (residing partly in the resin), *fecula*, and a *fibrous* or *woody portion*. Dr. Fitzgerald Bird, in 1822, published an inaugural dissertation on the root, and gave a more accurate and minute analysis, the steps of which are carefully detailed by him. He found the root to contain: 1. *Cinchonin*; 2. *Extractive matter*; 3. *Gummy material*; 4. *Resin*; and 5. *Gallic acid* in a state of combination. The colouring principle of the root resides chiefly in its resinous parts, as the alcoholic solution is always more than twice as highly coloured as the aqueous. Papers dipped in these solutions receive a bright salmon colour from the tincture, but a very faint one from the aqueous solution.

In 1824, a series of experiments were performed by the late Dr. Dana, of New York, and he discovered a peculiar organic alkali in the root, which he called *sanguinarina*. This alkaloid, no doubt, contains the *active principle* and medical virtues of the plant, and is an acrid white substance, which forms coloured salts with the acids. I have discovered this principle in the leaves, and have no doubt it exists in the seeds also.

The following are the different methods which may be employed to procure this alkaloid, which are here called after the respective chemists, for convenience of description:

Sanguinarina by Dana's Process.—The finely powdered root is to be infused in water acidulated with muriatic or acetic acid, precipitating with ammonia, collecting the precipitated matter, boiling it in water with pure animal charcoal, filtering off

the water, treating the residue left upon the filter with alcohol, and finally evaporating the alcoholic solution.*

Other methods are described as Dana's, which are of sufficient importance to mention, such as: Digesting the finely powdered root in absolute alcohol, adding to the tincture a solution of ammonia, so long as it occasions any precipitate. A grey powder falls down, which is to be treated as described in the process given above.

The advantage of employing absolute alcohol is that everything soluble is taken up by it. A white pearly or pearl grey substance remains, which is the sanguinarina.

Dr. James Schiel, of St. Louis, Missouri, determined the identity of sanguinarina with chelerythrine, and he gives the following as the simplest process of preparing either alkaloid:

Sanguinarina by Schiel's Process.—Digest the root with water strongly acidulated with sulphuric acid, precipitate with ammonia, wash and dry the precipitate, dissolve it in ether, treat with animal charcoal, filter, and precipitate with sulphuric acid dissolved in ether. A pure sulphate of sanguinarina is thus obtained, which may be decomposed in the ordinary method to obtain the alkaloid.†

Schiel's process has the advantage of both cheapness and simplicity. I have prepared the alkaloid by Dana's and Schiel's methods, and obtained, perhaps, an equal quantity of the alkaloid by each. As the identity of sanguinarina with chelerythrine has been established by Schiel, found in celandine long subsequently to Dana's discovery, I quite agree with Dr. Wood,‡ of Philadelphia, that the name of chelerythrine should be abandoned.

Riegel, however, suspects that the *porphyroxine* found by Merck in opium, is identical with *sanguinarina*, as well as with *chelerythrine*, and the alkaloid discovered by Walz in the Eschscholtzia Californica.§

Sanguinarina may also be conveniently procured by a method similar to that employed by Probst for obtaining chelerythrine from celandine. This consists of the following process:

Sanguinarina by Probst's Process.—A strong ethereal tincture of the dried and powdered root is first to be prepared; a current of muriatic acid gas is to be passed through this, which will throw down the muriate which is insoluble in ether; it is to be dissolved in hot water after filtering, and precipitated by ammonia. This is to be collected and dried, dissolved in ether, decolorized by animal charcoal, precipitated by means of muriatic acid gas, and decomposing the muriate as before.‖

Sanguinarina is a white pearly substance, having a bitter and an acrid taste, very sparingly soluble in water, soluble in ether, and very soluble in alcohol. It possesses well-marked alkaline characters: thus it changes turmeric to a brown, and purple cabbage infusion to a green. When heated, it melts into an oil, and burns without any residue. Concentrated nitric acid decomposes it. Its formula, according to Schiel, is C_{37} H_{32} N_2 O_8.

With the acids, it forms salts of some shade of red, crimson, or scarlet, of great intensity and beauty; these are soluble in water and alcohol, and form beautiful red solutions, in which, perhaps, the crimson predominates, but of a decided bitterness. Chloride of platinum precipitates them of an orange red, and infusion of galls of a yellowish red colour.

The following are the more important salts of sanguinarina:

Sulphate.—A pure sulphate is obtained in the preparation of the alkaloid by Schiel's process.

Hydrochlorate.—As obtained in the preparation of the alkaloid by Probst's process

* *Annals Lyceum of Nat. Hist.*, New York, ii., 250. In *United States Dispensatory*, 11th edit., 1858.

† *Silliman's Journal*, N. S., vol. xx., p. 220.

‡ In a letter to the author.

§ *Jahrb. fur Prakt. Pharm.*, xi., 100, in *Chem. Gaz.*, vol. iv., 197.

‖ *Chemical Gazette*, vol. i., p. 145.

it is of a magnificent scarlet colour, which, when dissolved in water, yields, on the addition of ammonia, pure sanguinarina in white or slightly coloured flocks, which become a yellow powder by washing and drying.

Hydrochlorate of sanguinarina is a red agglutinated friable mass. The powder, under the microscope, presents an agglomeration of well-defined small crystals. It is readily soluble both in water and alcohol, especially when heated, and is insoluble in ether.*

Acetate.—This, equally with the hydrochlorate, is peculiarly pungent and acid.

Oxalate.—Oxalic acid unites with sanguinarina, and forms minute needle-shaped crystals, visible under the microscope.

Porphyroxin.—Riegel extracted a principle from the blood-root, which he found to be analogous to the porphyroxin discovered by Merck in opium, and this has induced me to adopt the same name for it in the sanguinaria. At the same time, I wholly dissent from the suspicion entertained by Riegel that this substance is identical either with sanguinarina or chelerythrin. It may be observed that porphyroxin obtained from opium crystallizes in colourless, minute, shining needles, is neutral, becoming coloured of an olive green by concentrated nitric or sulphuric acids, and is dissolved by dilute acid, becoming red on boiling; whereas the crystals of the same substance obtained from sanguinaria, are of a tabular form.

Porphyroxin, which is a *second* alkaloid in the root of sanguinaria, is obtained by extraction with water containing acetic acid, precipitation of the sanguinarina by ammonia, neutralization of the wash water with acetic acid, and precipitation with infusion of galls; the deposit is collected, well washed, dried, and digested with an alcoholic solution of potash as long as anything is dissolved, carbonic acid passed into the solution, and the spirit removed by distillation. The residue is exhausted with water, this evaporated, and what remains extracted with ether, from which it separates on evaporation as a dirty-white crystalline mass.

By solution in alcohol and treatment with animal charcoal, it is obtained in small colourless tabular crystals, which are void of taste and smell, and are very sparingly soluble in water, more readily so in alcohol. It yields with acids colourless crystalline salts, which have a bitter taste, dissolve in water, and from whose solutions it is precipitated of a white colour.†

Puccine.—This is a third distinct principle discovered by Mr. Edward S. Wayne, of Cincinnati, in the ether, after the precipitation of the sulphate of sanguinarina in the process of Schiel. As it has not been named, I have ventured to call it *puccine,* deriving that appellation from the Indian name of the plant.

Preparation.—After precipitating all the sanguinarina by Schiel's process, there remains a substance held in solution by the ether. This is of a much deeper red colour, and leaves a yellowish solid deposit upon the sides of the vessel. If the ether is left to evaporate, a substance is left of a dark red colour, and without crystalline form. This must be redissolved in ether, and agitated with dilute sulphuric acid, until all the sanguinarina is removed. By separating the ethereal portion from the acid, and allowing spontaneous evaporation, a dark red translucent mass remains behind. If this is treated by alcohol in a displacer, a deep red tincture is obtained, upon adding water to which, a precipitate is thrown down, to be collected upon a filter and dried. This is the Puccine.‡

If diluted hydrochloric acid be added to a solution of the mass in boiling alcohol, a deep red colour is produced, and when set aside to cool, deposits beautiful needle-shaped crystals of a bright red colour.

With sulphuric acid, it forms a confused warty mass of crystals, which rub to a bright red powder.

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* *Philosophical Mag.*, January, 1843.

† *Chemical Gazette*, vol. iv., p. 198.

‡ *Amer. Jour. of Phar.*, vol. xxviii., p. 521, Nov., 1856.

From its acid combinations, it is precipitated of a pale yellow colour, which, when dried, has a pale red tint.

The quantity of puccine is so small, that fifteen pounds of the root yielded but 130 grains of it. This substance, therefore, is pale red, tasteless, insoluble in water, but soluble in alcohol and ether, and unites with hydrochloric and sulphuric acids to form crystallizable compounds, of a deep red colour.

Chelidonic Acid.—This acid has been obtained from the root by Mr. Wayne, who considers the acrid and pungent taste it possesses as due entirely to a salt of sanguinarina, probably the chelidonate. The sanguinarina and puccine he mentions as having but little taste. He moreover asserts that the red colour of the root, the tincture and other fluid preparations, is not due solely to the sanguinarina.*

Fecula.—The method I used to detect the presence of starch was as follows: A hot aqueous infusion was prepared from the powdered root, and allowed to cool; from this was precipitated a flocculent material by alcohol. This was allowed to settle 24 hours, and then examined with the microscope, when numbers of clear, thin, and transparent starch granules were seen, mostly of a circular form, the hilum not being visible unless occasionally. Smaller irregular bodies were also present, but these were not cellulose.

A very few long needle-shaped crystals were also seen, greatly multiplied on adding a drop of sulphuric acid, when they assumed the form of stars around any central body for a nucleus, many of the needles crossing one another. Some resembled a bundle of thin reeds tied round the centre. A drop or two of the tincture of iodine added to the fluid in a test tube, converted it into its characteristic dark blue colour. The demonstration of the presence of fecula was therefore positive, chemically and microscopically.

Dr. Bigelow only inferred the presence of fecula from finding the hot infusion to be viscid, glutinous, and to stiffen linen. This he precipitated by alcohol, soluble in nitric acid, and again thrown down by alcohol.

Saccharine matter.—This I discovered by applying the usual tests for sugar to an infusion of the powdered root on being cooled. Barreswil's solution of the tartrate of copper and potass indicated a tolerable quantity of sugar, a very heavy yellow precipitate of the sub-oxide of copper falling.

Vegetable Albumen.—I have found a small quantity in the infusion of the root, but by no means so much as exists in the seeds, which yield a large amount of it.

Fixed Oil.—A slow and continued heat, applied to an infusion of the bruised root, produces a thick iridescent continuous film upon the surface of the liquid, not unlike that on mutton broth, which, on being collected and examined, proves to be a yellowish coloured fixed oil, soluble in ether. It can also be readily obtained without the application of heat, simply by being allowed to stand three or four days in the heat of summer. This oil possesses an oily, bitterish, and somewhat acrid taste, immediately felt in the fauces. It may be procured in other ways besides those I have mentioned.

The *analysis* of the blood-root, as derived from the experiments of various observers, including those of my own, may be represented as follows:—

1. Sanguinarina
2. Porphyroxin
3. Puccine
4. Chelidonic acid
5. Fecula
6. Saccharine matter
7. Vegetable albumen
8. Orange-coloured resin
9. Fixed oil

* The same Journal just quoted.

10. Extractive matter
11. Lignin
12. Gum (a little)

The seeds contain probably the greater number of the foregoing, but a fixed oil, obtained by expression, together with much albumen, are the principal ingredients which enter into their composition.

ECONOMICAL USES.

The economical purposes to which this plant is applied are few, but they are not the less important.

The earliest use made of the juice of the root of the sanguinaria, independent of its therapeutical agencies, was as a pigment to smear and colour the bodies of Indian warriors. At the same time, it was generally employed by native Indian artists to draw rude figures, and, as a dye, to colour their baskets, bark work, ornaments, and even some domestic utensils; hence one of its vulgar names, *Indian paint.*

Wherever the plant is grown, the Indians use it for these various purposes up to the present day. The Canadian settlers in the time of Charlevoix made extensive use of the juice to stain furniture; so that it would seem to be a plant not only well known, but extensively employed for miscellaneous purposes both in medicine and the arts.

The juice of the root is now also well known to produce a fine dye of an orange colour, and is extensively employed by many of the country people and others in the United States for dyeing flannel and woollen cloths. The knowledge of its application in this way I think not improbable to have been first derived from the Indians, who seemed to be well acquainted with the permanent nature of its colouring matter.

The value of the blood-root as a dyeing agent was fully proved by the experiments of Dr. Downey, of Maryland, in 1803. These were made with a view to find a suitable mordant to fix this dye. It appears that the colour of flannel and silk stained with this juice could never be entirely washed out; that the sulphate of alumina, or alumina alone, and the permuriate of tin, are tolerably good mordants for flannel, cotton, silk, and linen. Permuriate of tin was the only mordant that fixed the colour on cotton and linen.

This plant was then employed as a dye in the woollen cloth manufactory near Wilmington, Delaware. "If success has been obtained," Dr. Downey observes, "in fixing the colour permanently, there can be no doubt that the dye obtained from puccoon will become a highly important article in domestic manufactures."

I have reason to believe that it is now extensively employed in many parts of the United States, not only as a dye, but for other purposes in the arts. The sources of my information on these points, I regret to say, were not so accessible as could have been desired. I have recently ascertained that the plant is now in active use in France, to dye silks and muslins of a permanent orange colour.*

In that popular and deservedly well-known work, the *Commercial Products of the Vegetable Kingdom*, by P. S. Simmonds, 1854, under the head of Oleaginous Plants, and those yielding fixed or essential oils, the following extract has come across my notice :—

"The seeds of the *Argemone mexicana* and of the *Sanguinaria canadensis* also contain a bland, nutritious, colourless, fixed oil. The mass from which the seed is expressed is found to be extremely nutritious to cattle."—Page 511.

The cake, after the oil is expressed, is thus used for feeding purposes, and Mr. Simmonds has since informed me that the oil is medicinally employed in North America for cattle. Further knowledge about this would prove highly valuable, and should circumstances hereafter furnish me with it, it shall be rendered available elsewhere.

Partly in connexion with this subject, it may be here stated that the leaves

* *Dict. Universel des Sciences*, &c. Par Bouillet. Paris, 1854.

and the root are given (on the authority of Dr. Downey) by the farriers in Maryland to horses, to induce sweating, and thus promote the shedding of their old coats of hair.

An economical purpose to which the plant may still further be applied, is to prepare a resinous soap from the root. The residue, after the preparation of sanguinarina by Schiel's process, mixed with potass and boiled, formed a thick pultacious mass, which, after some days, evaporated to the consistence of soap of a dark grey colour. I have no doubt whatever that an investigation into its saponiform properties might lead to very interesting and, at the same time, profitable results.

ADMINISTRATION.

1. Pulvis Sanguinariæ.—*Powder of Blood-root.*—The usual dose of the powder as an *emetic* is from 10 to 20 grains suspended in water. It is preferable sometimes to administer it in the form of pill to avoid the irritation of the fauces. Dr. Wood thinks it questionable to bring it in direct contact with the mucous membrane of the stomach in its concentrated form. Dr. Leonard frequently combines it with ipecacuanha, and the combination is a prompt and exceedingly easy emetic for old or young persons. As a nauseating and stimulating expectorant, the dose is from 1 to 5 grains, repeated more or less frequently according to the effect desired. Grain doses will produce a diaphoretic and expectorant effect; if given frequently, say every one or two hours, then it will exert a sedative action, and reduce the frequency of the pulse.

2. Pulvis Sanguinariæ Compositus.—*Compound Powder of Sanguinaria.*—(The Author.) (Sanguinaria, powdered, ℈ij.; hard opium, powdered, ℈j.; sulphate of potash, powdered, ʒij. ℈j.; mix them.) Every 10 grains contain 1 grain of opium, 2 of sanguinaria, and 7 of sulphate of potass. The dose of this powder is from 3 to 15 grains, and I have found it the most convenient preparation of blood-root, and one that can be depended upon. It may not inaptly be compared to the Dover's powder, the ipecacuanha of which is replaced by the sanguinaria, but in double the quantity. The majority of cases in which I have employed this remedy were treated with this powder, and I can recommend it as probably the least irritating of all the preparations of sanguinaria.

3. Pulvis Sanguinariæ cum Camphora.—*Powder of Sanguinaria with Camphor.*—(Sanguinaria, powdered, ℈j.; camphor, powdered, gr. viij.; cloves, powdered, gr. xxxij.; mix them.) This is used as an errhine in coryza, and proves very efficacious.

4. Infusum Sanguinariæ.—*Infusion of Sanguinaria.*—(Sanguinaria, bruised, ʒv.; boiling water, Oj. Macerate for four hours in a lightly covered vessel, and strain.) The emetic dose is from ʒiv. to ʒviij. at short intervals, till its effects are produced.

5. Decoctum Sanguinariæ.—*Decoction of Sanguinaria.*—(Sanguinaria, bruised, ʒvi.; distilled water, Oiss. Boil down to a pint and strain.) The dose is the same as the infusion, but is a little more energetic, particularly if given warm.

6. Succus Sanguinariæ.—*Preserved Juice of Sanguinaria.*—This is prepared by expression from the fresh root, and adding alcohol; but I think it preferable to employ the expressed juice when required, as obtained fresh from the root. When the fresh root is broken, or the stems of the leaves, the juice will pour out in sufficient quantity for immediate use.

7. Oleum Sanguinariæ.—*Oil of Sanguinaria.*—This may be obtained by submitting the root with water to repeated distillation. The dose would be from one to four drops.

8. Extractum Sanguinariæ.—*Extract of Sanguinaria.*—(Sanguinaria, bruised, ℥v.; water, Oij. The bruised root is to be macerated for some hours in a portion of the water, then briskly rubbed, adding the remainder, and then set by for the dregs to subside. The liquor is to be then strained and evaporated to a proper consistence.) If warm water is used instead of the cold, the extract

soon becomes mouldy. The dose is from an eighth to half a grain three times a day. It may be necessary to commence with a sixteenth, according to the strength of the patient. Should griping or tenesmus ensue, the tincture should be substituted. My friend, Dr. C. B. Hall, of St. Thomas, Canada West, recently told me that the extract prepared by Tilden and Co., of New York, is much used in Canada as an elegant preparation in chest affections principally.

9. Tinctura Sanguinariæ, U. S.—*Tincture of Blood-root.*—This is the only officinal preparation, and is prepared as follows, according to the *United States Dispensatory*:—

"Take of blood-root, bruised, *four ounces*; diluted alcohol, *two pints*. Macerate for fourteen days, express, and filter through paper.

"This tincture may also be prepared by thoroughly moistening the blood-root, in powder, with diluted alcohol, allowing it to stand for 48 hours, then transferring it to a percolator, and gradually pouring upon it diluted alcohol until two pints of filtered liquor are obtained."—U. S.

This will prove emetic in the dose of two to four fluid drachms; but it is rather intended to act as a stimulant to the stomach, expectorant, or alterative, for which purpose from twenty to sixty drops may be given every two or three hours in acute cases, and three or four times a day in the chronic.*

10. Tinctura Sanguinariæ Greenii.—*Green's Tincture of Sanguinaria.*—Although I do not go so far as to believe with Dr. Horace Green that the officinal tincture is inefficient, it seems to me nevertheless that its strength might be increased with decided advantage, because the active principle of the root is readily taken up by the spirit. He recommends the absolute alcohol in preference to the diluted, in which I fully concur. His formula is as follows:—*Eight ounces* of the blood-root finely bruised are to be macerated in *two pints* of absolute alcohol, and then prepared in the usual way.

The dose is from fifteen to sixty drops every three or four hours, or three or four times a day, according to the necessity of the case.

11. Vinum Sanguinariæ.—*Wine of Sanguinaria.*—This may be prepared in the same manner as the tincture, substituting sherry wine for the diluted alcohol. The dose is the same as the tincture. It is recommended as being more pleasant and more powerful.

12. Acetum Sanguinariæ.—*Vinegar of Sanguinaria.*—(Sanguinaria, fresh and sliced, ℥ss.; vinegar, Oj. Shake it frequently, and it is ready for use in a few hours.) This is the process of Dr. Jennings. I think it preferable to recommend the root to be bruised and rubbed up with the vinegar, and filtered after a few hours. He found it most serviceable in the sore-throat of scarlatina, and it has been employed with advantage topically in some obstinate cutaneous affections.

13. Syrupus Sanguinariæ.—*Syrup of Sanguinaria.*—(Sanguinaria, in coarse powder, ℥viij.; acetic acid, f℥iv.; water, Ov.; sugar, ℔ij. Add to the powder two fluid ounces of the acetic acid mixed with a pint of the water, macerate for three days, transfer to a percolator, and displace with the remainder of the water mixed with the remainder of the acetic acid; evaporate the infusion obtained, by means of a water-bath, to eighteen fluid ounces, then add the sugar, and form a syrup, straining if necessary.) The foregoing is the formula proposed by Mr. T. S. Wiegand,† and it is one likely to prove serviceable to young children. The dose as an emetic is from one to two fluid drachms.

14. Unguentum Sanguinariæ.—*Ointment of Sanguinaria.*—(Sanguinaria, finely powdered, ℥j.; lard, ℥j. Mix.) Besides the uses mentioned in previous observations, it may be applied now and then to foul ulcers.

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* *United States Disp.*, eleventh edition, 1858; and Wood's *Therapeutics and Pharmacology*, vol. ii.

† *American Journal of Pharmacy*, vol. xxvi.; and *United States Dispensatory*, eleventh edition, 1858.

15. Sanguinarinæ.—*Sanguinarina.*—The various modes of preparing this alkaloid were given when speaking of the composition of the plant, and therefore unnecessary to repeat here. It has not been used in medicine so far as I am aware, nor has Dr. Wood (the talented author of the *United States Dispensatory,* and other works) employed it, as mentioned to me in his letter of the 22nd of February, 1858. I would estimate the dose at from one-sixteenth to half a grain dissolved in some acid. The sulphate or hydrochlorate would be a more convenient preparation in doses of an eighth and quarter of a grain. To an asthmatic female patient I prescribed a twelfth of a grain of the sulphate with extract of conium twice a day, with the most extraordinary relief to the breathing and expectoration.

16. Sanguinarin is a preparation from the laboratory of B. Keith and Co., of New York. It is a compound of the alkaloid, the resin, a resinoid, and a neutral principle, as I am informed by my friend Dr. Badgley, who kindly presented me with a sample of it. The dose is a quarter to half a grain to begin with. It is said to combine the leading active principles of the sanguinaria.

TANNATE OF BISMUTH.

M. Cap, of Paris, has drawn the attention of the medical profession to the valuable therapeutic properties of a combination of oxide of bismuth and tannic acid. This new compound, which is called *tannate of bismuth,* has been prescribed for some months past by MM. Demarquay, Aran, Bouchut, and others, and has proved remarkably efficacious in the treatment of diarrhœa, either chronic or acute. The following is the formula of M. Cap for its preparation:—

Take of crystallized nitrate of bismuth 44 parts, treat them with water, adding at the same time carbonate of soda in slight excess; collect the white hydrated precipitate upon a filter, wash it, and then triturate it in a mortar with 20 parts of pure tannin. Dilute the magma with water, throw it upon a filter, wash it, allow it to dry either in the air or in a stove at a very moderate heat, and reduce it to powder. Thus prepared, tannate of bismuth is a yellowish, insoluble, tasteless powder. It is easily suspended in a mucilaginous fluid, and may be advantageously administered in that form; it may also be given in pills. The dose is from 30 to 60 grains.

The chemical composition of tannate of bismuth may be stated thus:—

Oxide of bismuth.....	one equivalent	= 29.6 or 53 per cent.
Tannic acid	"	= 26.5 or 47 "
		100

—*Bulletin de l'Académie Impériale de Médecine*, 29th Nov., 1859.

FOREIGN QUININE.

As a reduction of the duty upon chemicals, consequent upon Mr. Gladstone's revision of the tariff, is likely to lead to an increased importation of some articles of this class, we think it right to point out the great necessity of a careful chemical examination as to their purity.

We are led to these remarks in consequence of having recently examined some sulphate of quinine of foreign manufacture, now being offered for sale in London. The quinine in question is imported in sealed phials, bearing labels stating that each phial contains *one English ounce.* An examination of two of these phials disclosed the fact that the quinine they contained was in a very damp condition, so much so, that the paper below the cork was completely decayed, and the cork itself discoloured, as well as the quinine immediately beneath it. In addition to this, the weight of one ounce avoirdupois was deficient in the case of one phial by sixteen grains, and in that of the other by twenty-nine grains. The further loss by drying to a normal condition was, in the first case, twelve grains;

supposing a similar loss in the second, a purchaser would thus be defrauded in weight alone to the extent of more than seven per cent.

In the case of a third phial examined (which bore, however, a different label, though one of the same manufacture), the ounce was deficient by five grains, while the loss by exposure to air in a dry sitting-room for seventeen hours was thirty-nine grains.

ARSENIC IN PYRITES AND ARTIFICIAL MANURES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In your number for September last you inserted a paper by Professor Davy on the above subject, read before the Agricultural Society of Dublin; upon which I made some comments in your number for October; and in the following number you inserted a rejoinder from Professor Davy. Letters and articles have also appeared in the *Gardeners' Chronicle*, from which you have given some extracts. The subject is a very important one, and, in order to bring more new facts to bear upon it, I requested the careful attention of Mr. Ogston, an agricultural and analytical chemist, formerly a pupil of Professor Graham's, to the whole matter. I have received his reply, which I think of sufficient importance to deserve a place in your Journal. I accordingly enclose it for insertion, *s. v. p.*, in your forthcoming number, and remain,

Yours truly,

6, *Sandhill*, *Newcastle-on-Tyne*, *Feb.* 14*th*, 1860. Henry Scholefield.

22, *Mincing Lane*, *London*, *E.C.*, 26*th Jan.*, 1860.

Sir,—I read with a good deal of interest the extract from Dr. Davy's paper on the absorption of arsenic by growing plants, and the remarks made upon it in the *Agricultural Gazette*. The two facts which struck me most forcibly as the result of Dr. Davy's experiments were, first, that a saturated solution of arsenious acid could be applied to the roots of plants without injury to their growth; and, secondly, that when manured with ordinary superphosphate of lime, the quantity of the poison assimilated was sufficiently large to allow of its detection in a portion of a turnip that could be conveniently operated upon in the laboratory.

In order to satisfy myself with regard to the first question, I watered the ground about the roots of some strong cabbage plants, of some months' growth, with a saturated solution of arsenious acid, and in several trials, after two doses, at intervals of three days, the plants drooped, and died within the week. The same experiment repeated with Scotch kale—the only other plant I could conveniently get at—was attended with the same result. These plants, after the lapse of a few days, were removed from the ground, and various portions of their stem and leaves examined by Marsh's test for arsenic. It was found only in the portion of the stem close to the roots, and which were darkened in colour in the interior; in no case was the poison found in the leaves, or in the stem at more than five inches from the ground. In some other cases the solution of arsenious acid was variously diluted before application to similar plants, growing under precisely the same circumstances of soil and aspect; and when the dilution was sufficiently great as to produce no bad effect on the appearance of the plants, no arsenic could be detected in *any portion* above the ground. The roots themselves were not examined, as being likely to retain mechanically some portion of the mineral upon their surfaces.

I do not give you these experiments in any detail, as a more favourable time of year, and the opportunity of submitting a greater variety of plants to the ordeal, would be desirable; but so far as they go, they incline me to believe that arsenic, when absorbed in sufficient quantity to be detected by our very delicate tests, is also in sufficient quantity to destroy the vitality of the plants.

With reference to the second question—viz.: How much arsenic an agricultural crop (say turnips) can obtain from an ordinary dressing of arsenical superphosphate? a little calculation will show how extremely difficult any estimation of its weight would be.

Take a very bad sample of pyrites to contain .30 per cent. of arsenic, and consider—as is the case—that in the manufacture of oil of vitriol one-half of this is stopped by condensation in the flues, .15 per cent. will remain in relation to the pyrites, or about .10 in relation to the manufactured oil of vitriol. Now, suppose the superphosphate made from this acid to contain 20 per cent. of it as a constituent, and that 3 cwt. are used as a dressing per acre; then will be added to this acre .07 of a pound of arsenic, and this is to be distributed over from 20 to 25 tons of roots, giving a per-centage infinitely small, and, in my opinion, relieving us from the necessity of the smallest anxiety upon the subject. If, however, even this quantity is objectionable, the use of the Belgian pyrites, in which I have never found a trace of arsenic, would obviate all difficulty.

I am, dear Sir, yours faithfully,

Mr. H. Scholefield. E. H. Ogston.

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On Platinum and the Metals with which it is Associated (*continued*).—*Methods for Analysing and Assaying the Native Platinum.*—The native ore of platinum contains the following substances: 1st. Sand, which is never perfectly removed by the washing. This sand contains quartz, zircon, chrome iron, and, in the Russian ore, titaniferous iron.

2nd. Osmide of iridium. The osmium in the native platinum is always found presenting the different appearances which were first pointed out by Berzelius. The brilliant plates; the small grains, roughened on the surface, apparently by the action of the aqua regia; and the little graphitoidal scales, which may be separated by a sieve, owing to their small dimensions. These three varieties of osmium are always found in the native ore.

3rd. Platinum, iridium, rhodium, and palladium, which exist intimately alloyed together.

4th. Copper and iron in the metallic state.

5th. Gold, and, more frequently than is generally thought for, silver. The chloride of silver is dissolved to a notable extent in the aqua regia and the sal ammoniac, and in the processes usually adopted is precipitated with the palladium. In the analysis of this ore, it is of the utmost importance that the portion operated upon should fairly represent the mean composition of the entire sample. For the estimation of the sand, a small earthen crucible, with a smooth interior, is selected (such as are used for calcining the coronet of gold in assaying are recommended), in which a little borax is fused, in such a manner as to varnish the sides. Seven to ten grammes of pure and finely granulated silver are introduced, with two grammes of the mineral; the layer of ore is covered with ten grammes of fused borax, and, lastly, a few small fragments of wood charcoal are placed on the surface. A temperature a little above the melting point of the silver is applied; the borax melts and dissolves all the silicious matters present. When the operation is concluded, the button of silver, containing the osmium, platinum, and all the metallic substances is detached, and, if necessary, the last portions of borax are removed by digesting it in a little weak fluoric acid. It is then dried, heated, and weighed. By subtracting the weight of the button from the sum of the weights of the silver and mineral employed, the amount of sand originally present in the mineral is obtained. This amount it is very important to know; it represents the only constituent present in this expensive mineral which is absolutely without value, and its determination is, therefore, of the most importance in the valuation of the ore. In consequence of the rapidity with which the operation may be performed, the authors

recommend that it should be repeated several times upon samples selected from different parts of the lot.

For the determination of the *osmide of iridium*, two grammes of the mineral are treated with aqua regia, at a temperature of 70° C. until the platinum is dissolved. The aqua regia is renewed from time to time during twelve or fifteen hours, until nothing further is dissolved. This operation occupies a long time, but it requires no attention. The liquors are decanted with the greatest care, cautiously observing whether any deposit of metallic scaly particles subsequently takes place. If it is necessary to filter, the least possible quantity of osmide should be put upon the paper. The solution is conveniently effected in a large leaker, covered with a funnel to prevent loss from spirting. The residual powder, consisting of osmide and sand, is washed by decantation, dried, and weighed. By subtracting the weight of the sand, determined in the previous operation, from the weight of this residue, the proportion of osmide is ascertained. In this process the button of silver, obtained in the estimation of the sand, may be employed instead of taking a fresh quantity of ore, the silver being dissolved out by nitric acid, the residue well washed, and then treated with aqua regia as described. In this case, the insoluble in aqua regia, of course, consists only of osmides, the sand having been removed. It must be understood, that in the process for determining the sand, the silver does not act as a solvent, but only mechanically, by absorbing the osmides and other metallic constituents, which may be again recovered almost intact.

The *platinum* and *iridium* are obtained from the aqua regia solution which is formed in the preceding process. It is evaporated almost to dryness by a low temperature, the residue rinsed with a little water, in which it should all dissolve, and pure alcohol added, to the extent of twice the volume of water employed. Pure crystallized sal-ammoniac is then added in large excess, and a gentle heat applied to effect its almost complete solution; the liquid is agitated, and allowed to stand for 24 hours. The precipitate, which is yellow, orange-yellow, or sometimes even of a cinnabar colour, containing most of the platinum and iridium, is thrown upon a filter, washed with alcohol, and the filter then placed in a tared platinum crucible, dried in a stove, and gradually heated up to dull redness, the first crucible being enclosed in a second for greater safety. The lids are then removed, and the filter burned at the lowest possible temperature. Once or twice after the incineration of the filter, a piece of paper moistened with turpentine is introduced into the crucible, which reduces the osmide of iridium, and determines the expulsion of the last traces of osmium. The crucible is then heated up to whiteness, or, by preference, the calcination is finished in a current of hydrogen by means of a platinum boat. The calcined residue is then weighed; it consists of a mixture of platinum and iridium, which is then digested at a temperature between 40° and 50° C. in aqua regia, diluted with four or five times its weight of water. The acid thus diluted is occasionally renewed until nothing further is dissolved. The insoluble residue consists of the pure iridium, which is then weighed, and, by deducting its weight from that of the mixture of platinum and iridium, the weight of the platinum is obtained. The liquid from which the yellow precipitate was filtered, is evaporated until the sal-ammoniac crystallizes out, allowed to cool, and a small quantity of a deep violet salt collected, which consists of iridium salt, containing a little platinum. It is washed with solution of chloride of ammonium, and then with alcohol, dried, calcined, reduced with hydrogen, and weighed. It is then digested in the aqua regia, together with the first product as just described, the weights of the two products being added together, and the weight of the iridium obtained subtracted from the total amount. This method is quite trustworthy, provided the aqua regia employed for the separation of the two metals is properly diluted, and the contact sufficiently prolonged. The amount of iridium dissolved is inappreciable.

The *Palladium*, *Iron*, and *Copper* are determined in the filtrate, charged with sal ammoniac resulting from the process last described. This liquid is deprived of the alcohol by heat, and of the hydrochlorate of ammonia by excess of nitric acid, which resolves it into nitrogen and hydrochloric acid, and, lastly, evaporated to dryness. The latter part of the evaporation being conducted in a glazed-covered porcelain crucible which has been carefully weighed. The residue is moistened with sulphide of ammonium and sprinkled with two to three grammes of pure sulphur. The crucible is then packed in an earthen crucible by means of pieces of charcoal, and heated to bright redness; it is then allowed to cool, and the porcelain

crucible weighed. It contains the metallic palladium, sulphides of iron and copper, and also the gold and rhodium. Concentrated nitric acid is poured in, which dissolves out the palladium, iron, and copper. After digestion at 70° C. for some time the liquid is decanted and the residue washed. The nitrates are evaporated to dryness, and heated to redness ; the palladium is reduced, and the iron and copper remain in the state of oxide. The latter are readily dissolved out by hydrochloric acid, and may be separated by the usual processes; the palladium remains in a state of purity; it is heated to redness, and weighed.

The residue remaining in the porcelain crucible after treatment with nitric acid consists of the *rhodium* and *gold*. This residue is weighed and treated with very dilute aqua regia, which dissolves out the gold, and sometimes, but very rarely, a minute trace of platinum; by again calcining and weighing what is insoluble, the weight of the gold is ascertained.. The rhodium, which now remains alone, should be heated in a current of hydrogen, and finally weighed. Such is the process recommended by the authors for the complete analysis of platinum ores, and by which they have determined the composition of the different commercial varieties of native platinum. It is, however, unnecessarily long and troublesome for the practical valuation of samples of ore. The authors, therefore, have furnished the following method of *assay*, which is an entirely dry process, and consequently well suited for those engaged in the manufacture of platinum.

The *Gold* is determined by treating ten grammes of the ore for some hours with boiling mercury, which is afterwards distilled in a glass retort, the residue heated to redness, and weighed.

The Sand is estimated by the process already described.

Platinum.—The impurities present in the ore, besides sand, consist principally of iron and osmide of iridium. The other metals, palladium, rhodium, and iridium, bear a constant relation to the amount of platinum present, always comprised between four and five per cent. It is, therefore, only necessary to determine the sum total of the platinum and other metals present in any sample of ore, and then deduct four per cent., the remainder represents the proportion of platinum. To effect this, fifty grammes of the mineral are introduced into an ordinary crucible, together with seventy-five grammes of lead and fifty grammes of well crystallized galena, ten to fifteen grammes of borax are then added, and the whole heated up to the fusing point of silver. The contents of the crucible are agitated from time to time, and the heat sustained until the grains of platinum are all absorbed by the lead, fifty grammes of litharge are then added in small portions at a time, in proportion to the rate at which it is reduced, and until it is present in excess, as indicated by the nature of the scoria and by the evolution of sulphurous acid ceasing. The heat is then withdrawn, and the crucible allowed to cool down slowly ; it is then broken, and the metallic button separated and cleansed from the plumbous and ferruginous scoria. It should weigh about two hundred grammes. Platinum ore, which is more or less ferruginous, is dissolved by lead with very great difficulty; galena is, therefore, employed to convert the iron and copper into sulphides, and so facilitate the combination of the platinum and lead. The metallic alloy falls to the bottom of the crucible, and entirely absorbs the osmides. The sulphides pass into the scoria, and when the litharge is afterwards added, are all converted into osmides, and absorbed by the borax. When the weight of the metallic button has been carefully taken, the lower portion, amounting to about the tenth of the whole mass, is sawn off and carefully weighed. The remaining piece, which is crystalline and brilliant, is crushed to powder, mixed with the dust formed by the sawing, and also weighed. A portion of this powder, which shall represent a ninth of the weight of the original button, is then taken and cupelled in a manner which will be presently described. The amount of platinum this yields is multiplied by ten, and the product taken to represent the amount of platinum present in the mineral; four per cent. being deducted, as already stated, for the other metals. The lower portion of the button, which is sawn off, contains the whole of the osmide of iridium. In powdering the superior portion only, and taking a fractional part for cupellation, it is assumed that the composition of the button is homogeneous throughout, and the proportion of osmide present is neglected. If it is wished to avoid this error, the piece containing these osmides is treated with nitric acid, and the lead dissolved out. The residue is washed, dried, and carefully weighed. It is then treated with aqua regia, which dissolves out the platinum metals and leaves the osmides. The insoluble

is then weighed, and the proportion of platinum metals and of osmides originally present in the sample thus obtained.

The Cupellation of the Platinum and its complete separation from lead, may be effected by two methods. The first process consists in adding silver to the alloy to the extent of about five or six times the amount of the platinum supposed to be present, cupelling the mixture, and weighing the resulting button. The difference between the weight of the silver employed and the weight of the button represents the amount of the platinum. The second method is to effect the simple cupellation of the alloy, by which the platinum is obtained in the pure and fused state and admitting of the examination of its physical properties. The metal is first heated in a large ordinary cupel, by which it is readily brought to a solid mass of a cauliflower form. It is then, while red hot and still upon the cupel, submitted to the action of the oxy-hydrogen blowpipe, the oxygen being in plentiful excess in the flame. In this manner it is not excessively heated, but is partially fused, and the remainder of the lead rapidly oxidised. When the lead has been thus removed, the metal is transferred to a cupel cut out of a piece of lime, and gradually heated until the platinum is ultimately fused in an oxidising flame and collected into one globule. It is then allowed to cool, care being taken to avoid any loss from the spitting which takes place during solidification. When cold, the button of platinum is removed, cleansed with hydrochloric acid, and weighed.

The authors have also provided methods, similar to the preceding, for the analysis of the residues obtained in the manufacture of platinum, and also for the osmides of iridium. These osmides, of which we have frequently made mention, occur in different forms, presenting very different appearances. The method of separating them and determining their proportion in the native platinum, has been already described. The substance employed by the authors for attacking and decomposing the osmides, is peroxide of barium.

Metallurgy of Platinum.—The authors describe the means they adopt for effecting the following operations:—1st. Revivifying by fusion platinum which has become unfit for further use. 2nd. Preparation of pure platinum for use in the arts. 3rd. Preparation of an alloy containing the metals present both in the platinum and the osmides. 4th. Preparation of a triple alloy of platinum, iridium, and rhodium, presenting certain valuable qualities. The revivification of old platinum is effected by fusion in lime furnaces, in the manner described in the former notice of this paper. All the foreign oxidizable metals or metalloids which may be present, are separated partly by volatilization and partly in combination with the lime of the furnace; so that the metal is rendered purer than in its original condition, and may be cast in moulds, and cast into any form it is wished. The metal so obtained, however, is too soft for a great many of its applications. The preparation of pure platinum from the ore is effected by mixing the mineral with its own weight of galena, and fusing the mixture in a reverberatory furnace, so arranged as to produce a reducing flame, and avoid as far as possible any rapid oxidation of the sulphide of lead. The mass is well mixed, so as to convert all the iron into sulphide, and to produce an alloy of the platinum of lead; some glass is then added, and sufficient litharge to effect the decomposition of all the sulphides. The metal is then allowed to remain perfectly undisturbed for some time, in order that the osmides may settle down and collect in the lower portion of the lead. The scoria is then removed, the alloy of platinum and lead is run off, the last portion containing the osmides being added to the next fusion, until it is sufficiently rich to be worked and employed in another process. The lead and platinum is then cupelled in the same apparatus that is employed for silver. At the latter part of the operation, the alloy, now very rich in platinum, solidifies, and may be removed after cooling its surface with water. The refining and fusion of the platinum is effected in the lime furnaces by means of the oxy-hydrogen blowpipe. From fifteen to twenty kilogrammes being worked in each furnace, and thus, by employing three or four furnaces, ingots may be cast weighing sixty to eighty kilogrammes. There is nothing, however, to limit the size of which the furnace may be constructed.

3. *Extraction of Platinum by Simple Fusion.*—Nothing is more simple than to prepare from the native mineral, properly selected, a triple alloy of platinum, iridium, and rhodium, having all the qualities of platinum, with the advantage of greater rigidity, and presenting a much greater resistance to the action of heat and chemical agents. The ore is simply fused, some pieces of lime being added to protect to some extent the material of the furnace. The osmium is volatilized in the state of osmic

acid, the palladium is vaporized, the copper and iron are oxidized, the latter, combining with the lime, forming a fusible compound. The osmic acid may be collected by passing the vapours, as they escape, over a vessel containing ammonia. It is necessary to melt the metal a second, and in some cases a third, time, before it is perfectly refined.

By this method alloys may be produced of any composition it is desired, and consequently possessing characters which may be varied to suit the purpose to which they may be applied. It is only necessary to mix with the mineral, the composition of which is known, either the osmides of iridium, or residues, which have been assayed by the processes given, in suitable proportions, and effect the fusion and purification in the manner described. It has been always stated in treatises on chemistry, and generally considered by the platinum manufacturers, that the presence of iridium destroyed the malleability and other qualities of platinum, which are necessary to its application in the arts. It appears, however, that so far from this being the case, such an alloy, when obtained by fusion, possesses more valuable qualities than the platinum itself; and the authors have obtained metals containing, in one case, 21.3 per cent. of iridium, and in another 19.6 of iridium, and five per cent. of rhodium, which are perfectly malleable, and may be worked into vessels which are almost unacted upon by aqua regia, and at the same time, from their greatly increased rigidity, retain their shape longer and better than if they were constructed of platinum.

On the Oxidation of Hydrochloric Acid.—At the last meeting of the Chemical Society, Dr. Odling, F.R.S., gave the results of some experiments which he had undertaken for the purpose of ascertaining whether the oxygen acids of chlorine could be produced by the direct oxidation of hydrochloric acid. He stated that, by passing the vapour of hydrochloric acid through a retort, heated in a water-bath, and containing a saturated solution of permanganate of potash, mixed with one-fourth its bulk of oil of vitriol, a distillate is obtained, which presents all the characters of a weak aqueous solution of hypochlorous acid. It possesses the peculiar odour and bleaching properties of that substance; and when submitted to redistillation, the same acid liquid passes over, while the residue in the retort, if neutralized with potash, furnishes crystals of the chlorate of that base. A similar result may be obtained by the employment of a mixture of binoxide of manganese and sulphuric acid, in the place of permanganate. It results, therefore, that hydrochloric acid may, by a simple process of oxidation, be converted into hypochlorous acid, from which, of course, the other oxygen acids may be readily obtained. This result, although of comparatively little practical value, has an important bearing upon certain theoretical considerations. In works on chemistry, at the present time, the oxygen compounds of chlorine are treated of as a perfectly distinct class of bodies from hydrochloric acid ; but Dr. Odling, after the manner of Laurent, regards these oxy-acids as compounds of oxygen with hydrochloric acid, and would represent them as follows, taking the equivalent of oxygen as sixteen :—

Hydrochloric acid.....H Cl
Hypochlorous acid (Cl O, HO) .....H Cl O
Chlorous acid (Cl O_3, HO).....H Cl O_2
Chloric acid (Cl O_5, HO).....H Cl O_3
Perchloric acid (Cl O_7, HO) .....H Cl O_4

He, therefore, considers that the experiments above described tend to substantiate this view, by showing, experimentally, the same relation between hydrochloric and hypochlorous acids which is expressed in his formulæ. In the discussion which ensued, Professor Brodie stated that he had made a similar experiment in reference to the acids of phosphorus, which are represented, according to the above view, as follows :—

Phosphide of hydrogen .....PH_3
Hypophosphorous acid (PO, 3HO)..PH_3 O_2
Phosphorous acid (PO_3, 3HO) .....PH_3 O_3
Phosphoric acid (PO_5, 3HO) .....PH_3 O_4

In these compounds, the first oxide, PH_3 O is wanting. Oxychloride of phosphorus, however, which would be represented as P Cl_3 O, may be regarded as the corresponding term in the chlorine compounds of phosphorus, and Professor Brodie's experiment consisted in passing oxygen gas through terchloride of phosphorus, P Cl_3, at its boiling point, when oxychloride of phosphorus was obtained.

ON GELOSE.

BY M. PAYEN.

Translated by Mr. Daniel Hanbury, and revised by the Author.

In the early part of the year 1856, M. De Montravel, a traveller coming from China, placed in the hands of General Morin a substance sold under the name of *Chinese Moss* [*Mousse de Chine*], having the form of long and very thin strips fastened together by two bands into little bundles. It was said to be extracted from a lichen growing upon trees in the south of China, and very abundant in the southern islands of the Philippine group.

In examining in my laboratory a specimen of this substance, obtained through the kindness of my colleague, I recognized that it was devoid of organic structure, and that it contained several immediate principles soluble in water (0.0607), and a minute proportion soluble in alcohol (0.007). The greater part, however, did not dissolve in cold water, though it increased much in volume, acquiring by degrees the form of rectangular prisms, which appeared to have been obtained by some process of moulding. This substance may be dissolved by acetic acid of 8°, heated to 208° F., with the exception of about two to three per cent. of its weight of azotized corpuscles [*corpuscules azotés*]. Hydrochloric acid diluted with ten parts of water dissolved it equally at the same temperature, whilst in the cold these two acids extracted little more than the principles soluble in cold water.

But the most striking property of that portion of the substance which is insoluble in cold water is:—1. To dissolve in boiling water, with the exception of the azotized corpuscles and some traces of other foreign matter. 2. To afford upon heating a solution, which, when cooled, forms a colourless, transparent jelly, thus giving a gelatinous consistence to 500 times its weight of pure water—that is, forming ten times more jelly than a like weight of the best animal gelatine. The preparation of light jellies is in fact the object with which this article is manufactured and employed by the Chinese. It is also used for the same purpose in some of our own colonies, especially, as we are informed by M. Morin Fils, in the island of Bourbon.

This gelatiniform product in a pure state constitutes an immediate peculiar principle, insoluble in alkaline solutions of soda, potash, and ammonia, as well as in water, alcohol, ether, and dilute acids.

One of its distinctive characters, which is quite peculiar, is that of dissolving slowly in a very small quantity of concentrated sulphuric or hydrochloric acid, which it colours brown, forming with one or other of them a brown compound, which gradually solifies, and which resists washing in cold or hot water, and even in caustic alkaline solutions.

This new immediate principle cannot be confounded with any other, and I have given it the name of *Gelose*. Its ultimate analysis presents the following results:—

Carbon	42.77
Hydrogen.....	5.775
Oxygen.....	51.445

As it has not yet been possible to form with it any definite combination, from which one could deduce its equivalent weight or its rational formula, I can only remark that it must be ranked among the immediate principles having oxygen exceeding the proportion necessary to form water with the hydrogen they contain.

Regarding this gelatinous principle in an economic point of view, it is evident that in order to produce a jelly of equal consistence, it would be sufficient to employ the tenth part of what is necessary when isinglass is used. Moreover it does not possess the peculiar smell of the latter product, nor the odour, more or less putrid, which gelatine is liable to contract by its ready spontaneous alterations.

Having made these observations on the chemistry of the so-called *Chinese Moss*, it remained to discover its origin. No lichen submitted to such experiments as ought to have extracted it, afforded any traces, but I have met with it in a sea-weed called *Algue de Java*. Of this plant, which is the *Gelidium corneum* of botanists, I obtained a specimen from Dr. Gubler, through the kind intervention of Dr. Montagne.

The following is the process which, founded on the preceding observations, has served for extracting the gelose from the *Gelidium*, and has enabled me to determine that this principle is contained in its cells, and that it does not itself form part of the tissue of the plant. This process may be used in examining for gelose in other

plants. I have already detected it in several of our sea-weeds, but in small proportion. I have also obtained it, but in greater abundance, from *Plocaria candida* (*Fucus lichenoides*), a sea-weed common on the shores of the island of Bourbon, and still more so on those of Mauritius.

The *Gelidium corneum* treated successively without heat, by dilute acetic and hydrochloric acids, water, weak solution of ammonia, and then with abundant washing, lost fifty-three per cent. of its weight by the dissolving of calcareous incrustations, salts, colouring matter, and other organic substances, not being gelose. This last is found contained in the remaining tissue. It is extracted by boiling in water without the breaking up of the tissue. The solution decanted boiling hot, becomes a diaphanous jelly upon cooling. It may be repeatedly liquefied at the temperature of boiling water, and will be found each time to gelatinize upon cooling.

Having dried this jelly, it was easy to prove its identity with the principle extracted from the commercial product brought from China.

Gelidium corneum, when deprived of the matters removable by dilute acids, ammonia, and washing in pure water, yields to boiling water fifty-eight per cent. of gelose.

Further researches may enable us to ascertain whether, among the sea-weeds of our own shores, we may not find the raw material for preparing gelose,* a substance capable in several forms of taking the place of isinglass, the price of which is often as much as thirty-four francs the kilogramme.—*Répertoire de Pharmacie*, Jan., 1860.

THE SOAP-BARK OF SOUTH AMERICA.

BY PROFESSOR S. BLEEKRODE, DELFT, HOLLAND.

Several months ago, a peculiar bark (*Quillaia saponaria*) was introduced into the European trade, and recommended to be employed instead of soap, for washing and cleaning printed goods, woollens, and silks, and especially for the delicate colours of ladies dresses, &c.

This soap-bark is externally black coloured, but internally the liber consists of concentric layers of yellowish white. The bark is remarkable for its density, as it sinks in water. The cause of this is the great quantity of mineral substances which it contains: thus the internal layers yielded 13.935 per cent. of ash, dried at low temperature, and 18.50 per cent. when dried at 100° C. The ash consists almost entirely of carbonate of lime, which forms 12.60 per cent. of the 13.935, and appears as small crystalline needles, isolated or in groups, in the cells of the liber, not only between its concentric rings, but in every part of it. These glitter in the sun, resembling, under the microscope, the arragonite form of the crystallised carbonate of lime.

Relative to the great amount of lime, it may be remarked that this mineral is generally characteristic of plants, in which mucilaginous or pectinic substances are found abundantly: thus the grains of the quince (*cydonia*) contain 10 per cent. of carbonate of lime, and are remarkable for their large quantity of jelly.

When the internal white layers of the bark are soaked and macerated in water, at the ordinary temperature, a clear solution, without any alkaline or acid reaction, is soon formed; this becomes slightly turbid by the action of the air. When shaken a heavy scum is produced. The bark loses nearly 20 or 25 per cent. in the water. I have prepared an extract from four drachms in nearly one pint of water, and one part of this was sufficient to make, with sixty-eight times its weight of olive oil, a perfect cream-like emulsion, which does not become separated, even after several months. By mixing equal volumes of the bark extract and of oil, the same emulsion is formed without change of volume, but in a short time the oil is changed into a thick, pure, white, cream-like substance, swimming upon the clear water. There is, however, no separation of the constituents of the oil, as is the case by the reaction of alkaline substances. Alcohol does separate the emulsion, the oil is restored, and a white granular substance subsides.

The extract mentioned, has the property of reducing gold from its chloride; the glass employed for the experiment will be beautifully gilded; the reduction is much accelerated by the influence of the direct rays of the sun. The same power of reduc-

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* [*Gelidium corneum* Lamour. is a widely distributed and most abundant species, common on the shores of the British Islands and doubtless on those of France.—D. H.]

tion is shown, by mixing the extract with the alkaline copper solution as prepared by Fahling for the quantitative sugar-proof; the reduction into the red oxide of copper immediately follows on the application of heat. That this reduction is not produced by the presence of a sugar-like substance or glucose, is demonstrated by the experiment of Boettger with the basic nitrate of bismuth, for when this is boiled with the extract of the bark it remains white, which does not happen when there is glucose present in the smallest quantity. The solution of mineral chameleon is immediately changed from green to light yellow.

I have observed that the mucilaginous extracts made with water at a low temperature, by macerating the roots of the marshmallow (*althæa officinalis*), of the comfrey (*symphytum*), and of the grains of the quince, have not the same influence on chloride of gold. The extracts of these roots precipitate the gold, under the form of the purple of Cassius, only at a boiling temperature; the mucilage of the grains of quince, however, likewise at ordinary temperatures, produces a precipitate having the lustre of metallic gold. The reduction of the copper, as mentioned above, will not happen. These mucilages have likewise the property of forming emulsions, but weaker, and not so lasting.

The extract of the soap-bark is coloured a reddish brown by nitrate of silver, and ammonia forms a precipitate. When a proper proportion of nitrate of silver with ammonia is prepared, a silver lustre, like that of the silvering of glass, will be produced by heat.

Concentrated sulphuric and nitric acids produce, by boiling, a sediment in the form of white flocks; the white flocks produced by the reaction of sulphuric acid are coloured brown by iodine.

The experiments with other chemical re-agents have not produced any characteristic result. The extract is not coagulated by boiling, nor precipitated by alcohol and ether. The cold prepared extract can be employed for washing, and deserves the name of "Vegetable Soap."

Indeed, long before the invention of our alkaline soaps, and even up to the present day, several roots and fruits were known by their capability of being employed as soap, and botanists have distinguished them by the name of *Saponaria* in their systems of classification. Pliny gave a description of the *Struthion*—our Shrubby Gypsophila (*Gypsophila Struthium, L.*). "It is astonishing," he says, "how woollens are bleached, and made supple by it—*Radicula lavandis lanis succum habet mirum quantum conferens candori mollitieique.*"—*L.* 19; *c.* 18). Dioscorides mentions that the soap-wort (*Lychnis*, our *Saponaria*) is everywhere sold in the shops for scouring and cleaning dresses. Several of the family of the caryophyllaceous plants (*Dianthus*, *Lychnis*, *Gypsophila*, *Silene*) are remarkable for this property in a greater or less degree. By recent chemical means there has been extracted from these roots a special substance, called *Saponine* or *Struthiine*, and to this, notwithstanding the very small quantity contained in the roots, the singular power is attributed of making emulsions, and of being used for soap, in washing. The soap-wort of the Levant (*Gypsophila*) is, to this day, employed in the East for washing and cleaning silks and shawls. It was generally used in the Mediterranean districts of France and Spain; the French called it *herbe aux foulons* (the fullers' plant). The *Saponaire* or *Savonière* of the French, is the root of a kind of *Lychnis*.

The vegetable soap-principle, saponine, was found by Henry and Bourtron Charland, in the bark of the *Quallaia saponaria*. *Le Quillay* is a tree of the family of Rosaceous plants, a native of Huanuco, in Peru. Ferdinand Lebeuf made special mention of this bark in 1850 (*Comptes Rendus de l'Académie des Sciences à Paris*, xxxi., p. 652) for its richness in saponine, and recommended it for pharmaceutical use in preparing emulsions of oils, resins, balsams, and several other insoluble medicaments. He mentions likewise the bark of the *Yallhoy* (*Monnina polystachia*).

From one bark, boiled with alcohol of 40° B. (or 0.828 sp. gr.), according to the method followed by Lebeuf, Rochleder, and Schwarz, the saponine was extracted. This substance is characterized by its lasting irritating smell, and by producing sneezing: in some cases a special aromatic flavour is perceived. It is remarkable how small a particle, a mere homœopathic dose, is sufficient to change a large quantity of oil into an emulsion. The saponine has likewise the power of reducing gold from its chloride.

The extract of the soap-bark, prepared as mentioned above, undergoes a spontaneous change, when exposed to the influence of the atmosphere for several weeks. The clear

solution is then transformed into a colourless, thick, but transparent jelly, with a slight acid reaction. Its property of making emulsions is not the least diminished, but it has lost the power of reducing gold and copper as before, and the reaction on the mineral chameleon proceeds very slowly. In short, to explain the change, it is sufficient to say, that by absorption of oxygen from the air, the substance, extracted by water, has been oxidised.

To conclude, it appears that the soap-bark retains two substances, saponine and pectine, both soluble in cold water, and equally endowed with the faculty of making emulsions with oils and fatty substances. The large quantity of isolated pectine in the soap-bark is explained by the separation from the lime during vegetation. The spontaneous oxidation has transformed the pectine into the gelatinous acids, the pectosic acid and pectinic acid.

Several years ago, in 1832, M. Braconnot, in his inquiries as to the transformations of several vegetable substances into a new principle by the influence of concentrated nitric acid, remarked that he found the saponine in the bark of the *Chicot de Canada*, or *Gymnocladus Canadensis*, Lam. He says that it is possible to substitute this bark (and also its leaves) for the soap-wort of the Levant. This tree is 30 or 40 feet high, able to stand our winters, and easily cultivated. I have also another sample of a bark containing saponine and pectine, which, when combined, are excellent for washing purposes.

Besides this, a kind of soap-bark is mentioned in the proceedings of the Boston Society of Natural History for 1855 (see also the *Edinburgh New Philosophical Journal*, vol. li., p. 201), obtained from a tree called *Chelaria saponaria*. As there is no plant known by the name of *Chelaria saponaria*, I suppose that it is wrongly printed for the *Quillaia*, treated of in this paper. The soap-plants used for washing in California, and preferred by those who know their merits to the best kinds of soap, are the bulbs of *Phalangium pomaridianum*. In the above communication it is stated :—"All these contain considerable quantities of oleaginous and alkaline principles in their composition, on which their value depends." This opinion is altogether erroneous. None of the vegetables known as vegetable soaps contain oils and alkali; their property is entirely derived from neutral substances as above described.

In Guiana, the bark and fruits of the soap-wood tree (*Sapindus saponaria*), called by the natives *Hurawassa*, is employed in the place of soap, and it is said that the fruit will clean sixteen times more goods than the same weight of common soap. A kind of *sapindus*, called *Rarak*, is used in the same manner, at the Moluccas, and at Java.

The study of vegetable substances for their application as neutral soaps, merits the attention of modern dyers and printers, and certainly they can be recommended for delicate colours which are liable to be injured by the alkaline soaps.—*The Journal of the Society of Arts.*

ON THE GALLS OF CYNIPS QUERCUS-PETIOLI.

The following communication on the galls of *Cynips Quercus-petioli*, taken from the *Gardeners' Chronicle*, cannot but interest our readers. It was at one time supposed that these galls might be substituted for the common nut-galls of commerce, but upon being submitted to analysis by Dr. Vinen (*Journal of the Proceedings of the Linnean Society*, vol. i., *Zoology*, page 72), they were found to contain a much smaller amount of tannic and gallic acids than is the case with those galls. They have also been analyzed by Mr. Braithwaite in the laboratory of the Pharmaceutical Society, with even more unfavourable results as to the quantity of tannic and gallic acids contained in them. They can never come into use, therefore, as a substitute for common nut-galls, and hence, as their presence is very injurious to the young shoots of the oaks, it is very desirable, indeed almost indispensable, for our landowners to take speedy measures to arrest their further progress in this country:—

"For some years past a silent unsuspected enemy has been invading the oak forests of England. In all the south-western counties galls, like those which we get from the Levant for the purpose of dyeing black, have been making their appearance, and annually increasing in quite a geometrical ratio. On several occasions the subject has been adverted to in our columns, especially in the year 1855, when Mr. Westwood published a figure of the gall, and a few months later by a correspondent at Worcester. Since that time the mischief thus caused has increased so alarmingly, that, unless some effectual stop can be put to the evil, the landowners of Devon, Cornwall, Dorset, Somerset, and even Gloucestershire, will have to abandon all hope of raising

oak timber. The trees have ceased to grow, acorns no longer appear, but in their stead the branches are loaded with hard dry balls, such as are represented in the accompanying cut.*

"These galls are caused by an insect known to naturalists under the name of Cynips Quercus-petioli. Sylvanus, writing in 1855 from near Worcester, so well described their then appearance, that we repeat his words:—They are 'very different from the innocuous soft galls upon the leaves, seldom very numerous, and dropping off with the foliage in the autumn. But these gall-nuts of C. Quercus-petioli are mostly persistent upon the tree, and continue there for a long time hard as bullets. They seize upon the young shoots of the year, often the leading shoot in young trees, and cluster at its termination, thus stopping the expansion of the buds by taking up their nutriment, and keeping the trees in a dwarf state. I have now before me young shoots that are terminated by eight or nine of these hard brown galls clustered together. I recently noticed in the oak plantations on Worle Hill, near Weston-super-Mare, that many young oaks had been quite ruined by their leading shoots being thus loaded, and some were absolutely dead. Now I have reason to believe that this attack upon the oaks, at least in this plantation, is of recent origin. Four years ago I first observed a few on two or three trees, and looked upon them as a curiosity; last year I was surprised to observe many more, and the present autumn, in walking through one portion of the plantations only, and without going out of the path, I counted 91 trees that were more or less subjected to this scourge—for thus it has become. Some, it is true, had only about a score of galls or so upon them, but many had hundreds clustered upon their branches thick as grapes, and the smaller trees were evidently drooping and checked in their growth by the absorbing villanous galls. Some of the trees were actually withered and dead, and others had their leading shoots killed, with the evident cause burdened upon them. It is clear to me that fresh trees are attacked every year by the increasing insect that produces the galls, and what can be done to stay their assaults? Though I only counted 91 trees in the Worle Hill plantations, I dare say I could have doubled this number by going deeper within the coppice; but say that only these 91 oaks had 50 gall-nuts on a tree—although many had hundreds of them—that only would give more than 4500 of the Cynips to commence the next season with, so that next year, instead of only 91 trees attacked, I may expect to find thousands on every tree, perhaps, throughout the plantations. The mischief is that the oaks are certainly rendered barren by these hard gall-nuts, and wherever they occurred on the larger trees there were no acorns at all produced.'

"The anticipations of Sylvanus that the evil would extend with great rapidity have unfortunately been fully realized. To such a length, indeed, has it spread, that it has become indispensable to arrest its further progress, if that be possible. For we do not imagine that the landowners of the West will willingly accept a crop of unsaleable ink-galls as an equivalent for their coppice wood or navy timber.

"In considering the manner in which this danger is to be met, we must first inquire how the galls are produced, and by what. Dr. Asa Fitch, the distinguished American Entomologist, speaks thus † of what is observed in the United States:—

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* This cut has been kindly lent to the Editors of the *Pharmaceutical Journal* by Professor Lindley.

† Fifth Report on Noxious Insects, to the State Agricultural Society of New York, par. 309.

"'On cutting into these galls the small limb on which they grow is found to have its wood thickened or swollen, and over it, forming the chief bulk of the tumour, is a corky substance of a yellowish brown or snuff colour, between which and the wood are several small hard grains resembling seeds, each having a cavity in its centre, in which, doubled together, lies a soft white footless worm or maggot. This, on completing its growth, changes to a pupa in the same cell, and subsequently to a fly like its parent above described ; whereupon, to escape from its confinement, it gnaws out of this hard seed-like envelope and onward through the corky substance and the external bark, thus producing those small perforations like pin-holes, which are always seen in these tumours after the insects have made their exit therefrom.'

"This description, although only applicable in strictness to a gall-fly unknown here, is sufficiently exact to convey an accurate idea of the general nature of the tumours under consideration. In every case, whether that of the oak apple, the oak bladder, the oak spangle, or the oak gall, the swelling called a gall arises from the irritation produced by a grub, which is hatched among the soft young cellular matter of the part attacked. This grub comes from an egg deposited by some four-winged fly of the genus Cynips, or of the little group named after it. Under the irritation thus produced the cellular matter increases more or less rapidly in size, the natural structure of the part attacked is destroyed, and protuberances of the most varied aspect are the result. In the midst of the cellular matter in which it is hatched, the grub feeds, grows, and finally passes through the changes natural to it, in the same way as the grub of a hive bee changes in its cell. At last it acquires its perfect condition of a four-winged fly, when, by the assistance of its hard horny jaw, it gnaws a hole through the side of the gall and escapes into the open air. When liberated, it in course of time discovers places like that from which it came, and there deposits its eggs as its mother did before ; then the insect dies. The eggs thus laid in the autumn hatch in the spring when warm weather returns ; by degrees new galls are the produce of their action, and our trees are again loaded with galls. Hence it will be seen that when the young galls are forming the perfect insects are dead, and our enemies are safely enclosed in prisons of their own formation.* Hence the advice of Dr. Asa Fitch as to the way of destroying them:—

"'Where any of these insects attack a valued tree which it is desired to preserve from their depredations, the remedy is obvious and simple. Before the galls which they produce are so far matured that the enclosed insects have perforated and escaped from them, they should be cut from the tree and burned. Fortunately, it is only small young trees that gall-flies are liable to destroy or greatly injure by their attacks. And their parasitic and other enemies restrain them from multiplying, so that it is seldom they will require any interference from man.'

"Unfortunately our English experience does not correspond with the last sentence of the learned American naturalist ; but his first advice certainly is sound. Destroy, *by fire*, the galls, before the dangerous insects escape. Nothing less than fire will do it. But then the question remains, 'How are they to be destroyed when a whole country is attacked?" To handpick them is impossible. The entire population would be insufficient for such a purpose. Our own opinion is, that very extensive and severe pruning must be had recourse to. If labour can be found from June to harvest-time, the twigs on which the young galls are appearing might be cut off by boys sent among the branches armed with the common long-handled nippers sold by implement makers ; and the prunings might be collected by girls and women into heaps, when they could be burnt or converted into soft charcoal. Or in many cases all the branches of a tree might be shortened back and destroyed ; or, when the lower branches alone are attacked, then those lower branches only need be removed. It might, indeed, be a question whether, in places where the trees have been very extensively invaded, the branches would not be better cut off before the leaves appear ; and if it is true, as is supposed, that the eggs of the Cynips are all deposited before the commencement of spring, this last plan would be much the best, because the oaks would then have the whole summer before them during which to make new wood.

"To take advice like this may be regarded as impracticable, and to follow it is doubtless attended with difficulty of no ordinary character. But oak timber is too important

* These statements are, we believe, entirely confirmed by the very careful observation of Mr. Nesfield, whose attention has been drawn to the subject by the mischief produced on property where he has been professionally engaged.

a part of all estates to be sacrificed without an effort to save it, and we do not see what possibility there is of its resisting the ravages of the Cynips unless some such plan as is now suggested is adopted. Perhaps, however, some correspondent in the infested districts may have discovered a better method; in which case he will render the public a very important service by explaining how he has proceeded."—*Gardener's Chronicle.*

ON WATER-GLASS, AND SOME OF ITS APPLICATIONS.

BY DR. JOHAN N. FUCHS.

The following paper was communicated some months ago to the Society of Arts by desire of H.R.H. the Prince Consort, and it contains information on some practica points respecting which inquiries have been made by some of our correspondents.

VARIOUS KINDS OF WATER-GLASS AND THEIR MANUFACTURE.

We have to distinguish four kinds of water-glass:—a. potash water-glass. b. Soda water-glass. c. Double water-glass. d. Fixing water-glass.*

At first, and for some time afterwards, my attention was merely directed to potash water-glass,† and as nearly all the experiments which I shall have to mention were made with it, I may as well state that potash water-glass is meant whenever the expression water-glass is employed.

MANUFACTURE OF POTASH WATER-GLASS.

A mixture of 15 parts of pulverized quartz, or pure quartz sand
10 parts of well purified potash
1 „ powdered charcoal

may be conveniently employed.

These ingredients are to be well mixed and exposed to a strong heat in a fire-proof melting-pot for five or six hours, until the whole fuses uniformly and steadily as much heat is required as is necessary to melt common glass. The melted mass is then taken out by means of an iron spoon, and the melting-pot immediately refilled with a fresh quantity. It is then broken up, pulverized, and dissolved in about five parts of boiling water, by introducing it in small portions into an iron vessel and constantly stirring the liquid, replacing the water as it evaporates, by adding hot water from time to time, and continuing to boil for three or four hours, until the whole is dissolved—a slimy deposit excepted—and until a pellicle begins to form on the surface of the liquid, which indicates that the solution is in a state of great concentration; it disappears, however, when the liquid is stirred; and the boiling may then be continued for a short time, in order to obtain the solution in the proper state of concentration, when it has a specific gravity of from 1.24 to 1.25. In this state it is sufficiently liquid to be used in many operations; in some instances it will be necessary to dilute it with more or less water. When evaporated to a syrupy consistence, it can be employed with advantage in but few cases.

Very frequently it is found contaminated with a little sulphide of potassium, and it becomes necessary to add a little oxide of copper or copper scales towards the end of the boiling, which liberates a small quantity of potash, but which renders it rather more suitable for many practical purposes than otherwise. If it is desirable, however, to have a water-glas which is entirely neutral, it requires to be boiled with freshly-precipitated silica as long as any silica is dissolved.

Freshly precipitated or gelatinous silica offers, in fact, the best and most convenient means of ascertaining whether a sample of water-glass is completely saturated with silica, by introducing it in small portions into the boiling liquid, when a saturated solution will dissolve no more, whilst an incompletely saturated solution takes up more or less.

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* The name "water-glass" is, in fact, a generic name employed when speaking of the above four varieties. I do not know whether a lithia water-glass might be obtained. Perhaps a good double water-glass of potash and lithia might be produced by replacing a part of the potash by lithia, for which purpose lepidolite could be conveniently employed. This double water-glass would no doubt be rather expensive; cases might, however, occur where expense would be a matter of secondary importance.

† M. F. Fikentscher, chemical manufacturer of Zwickau, in Saxony, was the first to manufacture water-glass on a somewhat larger scale, and of the best quality. He would no doubt manufacture soda water-glass also, if required, of an equally good quality, and at a cheap rate.

Litharge may also be employed instead of oxide of copper, in order to remove the sulphide of potassium, but requires to be added with great care, since an excess causes the water-glass to coagulate.

The solution is allowed to cool, and left to clear in the well-closed iron vessel. The clear liquid is then decanted off from the deposit (which may serve as a good manure) and filled into stoppered bottles or carboys, and kept for use under the name of potash water-glass.

It may also, for better transport, be evaporated to a gelatinous mass by constantly stirring the liquid, and then packed into tinned iron vessels.

Alcohol furnishes even a more ready means of preparing it in a solid state. By adding one-fourth volume of rectified spirits of wine to a concentrated solution, a gelatinous precipitate is produced, which strongly contracts after a few days, and is deposited on the bottom of the vessel in a solid mass. If the supernatant liquid, which very frequently contains a little carbonate of potash, traces of chloride of potassium, chloride of sodium, and sulphide of potassium, be decanted, and the deposit slightly washed with cold water and squeezed, the water-glass is obtained in a solid and very pure state, and completely saturated with silica. Water dissolves it easily and completely.

MANUFACTURE OF SODA WATER-GLASS.

Soda water-glass is prepared in the same way as potash water-glass; but since soda is capable of saturating more silica than carbonate of potash, it is evident that an equal quantity of quartz requires less carbonate of soda.

A mixture of—

45 lbs. of quartz
23 „ anhydrous carbonate of soda
3 „ charcoal dust

may be employed for a large charge.

The mixture fuses somewhat easier than potash water-glass. Professor Buchner has found that it can be prepared cheaper by means of Glauber's salt or sulphate of soda, in the proportion of—

100 parts of quartz
60 „ anhydrous sulphate of soda
15-20 „ charcoal dust

When the mass is completely saturated with silica, it gives with water a somewhat more opaque liquid than the glass prepared from potash in a like state of concentration.

Rectified alcohol does not precipitate it completely like potash water-glass, merely converting it into a gelatinous mass, and giving no precipitate at all, or only after a short time, when it is not completely saturated with silica, or when slightly diluted. This deportment enables us easily to distinguish it from potash water-glass.

MANUFACTURE OF DOUBLE WATER-GLASS.

Potash and soda water-glass are miscible in all proportions. A mixture of equal equivalents of potash or soda, however, must be considered to furnish the normal double water-glass, which is invariably obtained when 100 parts of quartz and 121 of seignette salt are fused together. This method being too expensive for all practical purposes, may be modified by employing equal equivalents of nitrate of potash, nitrate of soda, and the corresponding amount of quartz, which furnish a cheap glass suitable for all technical applications. It may also be prepared by fusing together quartz, carbonate of potash, and carbonate of soda, in the following proportions:—

100 parts of quartz
28 „ purified potash
22 „ neutral anhydrous carbonate of soda
6 „ powdered charcoal

This mixture is much easier to fuse than any of the previous ones.

A mixture of three measures of concentrated potash water-glass with two measures of concentrated soda water-glass, producing a soluble double water-glass, will be found to answer for all practical applications.

FIXING WATER-GLASS AND ITS MANUFACTURE.

I was for a long time of opinion that the ordinary water-glass, after being completely saturated with silica, forms the best and the most suitable for all purposes. A serious inconvenience, however, showed itself in its application to stereochromy: in the last

operation, that of fixing the colours, the pictures assumed a cloudy and dirty appearance in consequence of the rapid partial decomposition of the water-glass. This drawback caused Herr von Kaulbach and myself much anxiety, and suggested the idea that in this case the water-glass ought not to be completely saturated with silica. A few experiments proved this opinion to be correct; and by adding a portion of soda liquor silicium, or soluble silicate of soda, to the ordinary water-glass completely saturated with silica, I obtained a water-glass which perfectly answered the purpose. I shall call this mixture *fixing water-glass*.

In order to prepare the soluble silicate of soda (liquor silicium), three parts of pure anhydrous carbonate of soda are fused together with two parts of powdered quartz. It is kept in a rather concentrated solution, and one part by measure added to four or five parts of the concentrated potash water-glass completely saturated with silica. By this means silica and an excess of alkali are added, which are sufficient to prevent its rapid decomposition, without perceptibly altering its other properties. The water-glass, which was dull or opaque, is thereby rendered perfectly clear and a little more soluble. There is no reason why its use should be restricted to stereochromy, and why it should not be employed for various other purposes with great advantage.

PROPERTIES OF WATER-GLASS, AND ITS DEPORTMENT WITH OTHER BODIES.

It is important to study thoroughly its action upon other bodies in order to prevent errors, or drawing erroneous conclusions from certain changes or phenomena.

Solid or fused water-glass, if pure, has the appearance of ordinary glass, and dissolves gradually but completely in boiling water; in the cold, however, the solution proceeds so slowly, that one feels inclined to believe that it is entirely insoluble in cold water. It becomes entirely insoluble only when a much larger quantity of silica has been added and made to combine with it, or when a portion of potash has been withdrawn; frequently, also, when other bodies, viz., earths or oxides of the metals, &c., have been mixed with it, which form double or triple silicates, such as many mineral compounds and common glass itself is composed of; for I have always noticed that silica combines more readily with two bases than with one.

Acids—carbonic acid not even excepted—decompose the solution and separate silica in a gelatinous form. Solid water-glass is readily acted upon by dilute acids, and silica is separated in the form of a powder.

Salts of the alkalies, especially the alkaline carbonates or chlorides, cause viscous precipitates from a concentrated solution, and the whole solution seems to coagulate. In dilute solutions, a precipitate appears only after some time. Sal-ammoniac acts most powerfully by producing, even in a very dilute solution of the water-glass, a flaky precipitate, ammonia being simultaneously evolved. On washing this precipitate with water acidulated with nitric acid, pure silica is left on the filter.

The alkaline earths set free more or less potash on being brought into contact with a solution of water-glass, and combine with the rest of the potash to form double salts which are quite insoluble in water.

Alumina combines likewise with it, and forms a product insoluble in water; it is therefore necessary that the quartz which is used in the manufacture of water-glass should not contain any alumina. The insoluble residue which is left behind when the fused mass is dissolved in water, is probably owing to the alumina which the glass has taken up from the glass-pot.

If the water-glass is dissolved and exposed to the air in open vessels, it attracts carbonic acid and suffers decomposition, which causes it to coagulate sooner or later, and produces gradually a slimy deposit, which was found by Professor Buchner to contain potash.

Heat accelerates this decomposition. If the liquid is evaporated and the dry mass made anhydrous by further heating, it swells considerably, and will then be almost entirely decomposed. Water no longer dissolves it, and acids produce strong effervescence. By calcination it is brought back to its original state, and becomes again completely soluble in water.

It is evident that constant boiling is required to obtain the soluble water-glass in a solid state by means of evaporation, in order to prevent the carbonic acid from penetrating the mass. The same precaution must be observed when fused water-glass has to be dissolved, and care must be taken always to add boiling water in order not to interrupt the ebullition, and thus to allow the access of carbonic acid.

When solid or pulverized water-glass is exposed for some time to the action of the atmosphere, it undergoes the same change as during the evaporation. It effervesces strongly on addition of acids, and is only partly soluble in water, leaving a heavy deposit. On being strongly ignited, this residue becomes again soluble. If a drop is allowed to fall on the table or on the floor, it soon loses its transparency and becomes opaque, owing to a partial decomposition. The same takes place when it is poured from a bottle and a drop runs down outside the vessel; white streaks, which are difficult to efface, make their appearance. If the liquid glass is kept in a bottle which is only half-full and badly stoppered, a white deposit or ring is formed after a short time, which adheres so firmly that it cannot be removed entirely even by acids, and a more or less heavy deposit is found on the bottom of the vessel, owing to a partial decomposition of the water-glass—a fact which I did not become aware of for some time, on account of insufficient experiments and observations. I have stated in my pamphlet, p. 396, "that the dried and pure water-glass undergoes no palpable change by exposure to the atmosphere, and that it attracts from it neither water nor carbonic acid. A concentrated solution is likewise not perceptibly affected by the atmosphere, although it is decomposed and converted into a stiff jelly by passing a carbonic acid through it. A dilute solution becomes turbid on exposure to the air, and is gradually entirely decomposed."

I herewith correct this error.

When concentrated water-glass is brushed upon a solid substance, such as glass, marble, or thick paper, it soons dries up and forms a shining transparent coating, which, however, does not keep long, but becomes gradually dull, opaque, and sometimes fissile and cracked, and of a somewhat pulverulent appearance. This gradual change is caused by water which the air-dried water-glass retains in rather considerable quantity (about 12 per cent.), and which it loses but slowly, whilst it contracts more and more and acquires considerable hardness.

One of the most important properties of the water-glass, and one which renders it most suitable for practical purposes, is its binding and cementing power; it may be employed for imparting solidity and greater cohesion to loose masses, for joining separate parts of bodies or small particles to form a large whole, for filling up cracks or fissures, &c., and many more applications. Its action resembles that of glue; and it might, in fact, be called a mineral glue.

Its effects are most apparent when it is applied upon solid porous bodies which absorb it, and when it is brought together with pulverulent dust or sand-like bodies, or with substances which can be crumpled up between the fingers, but which are converted into a stone-like mass, from which the water-glass can no longer be dissolved.

The intensity of the effect produced depends upon the nature of the substances with which the water-glass is brought into contact; some possess a stronger affinity than others, and consequently are more powerfully cemented than others. There is, however, this essential difference, that a few, such as magnesia and oxide of zinc, form with the water-glass a chemical compound, whilst others are only mechanically combined, owing to mere adhesive action. The former action, by which bodies are rendered hard and insoluble, will be readily understood, because an insoluble double silicate is formed by the combination with a second base. The latter is more difficult to explain, especially since the water-glass shows a slightly different deportment with different bodies, and it is therefore not at all immaterial which body is chosen in order to obtain an intimate solid mass which resists the action of the water. Thus, for instance, water-glass exhibits a much greater power of adhesion for powdered marble than for powdered quartz. It has been shown, moreover, that the carbonic acid of the air promotes the consolidation of the water-glass, because it is partially decomposed when exposed to the air; however, this is not sufficient to explain the striking change which frequently becomes perceptible after the lapse of a few days. Carbonic acid, no doubt, loosens the slight tie which exists between silica and the alkali; but then the former does not remain passive, passing, according to its peculiar nature, through various states of cohesion, becoming itself active, retiring, so to speak, entirely upon itself, and cohering so intimately with the particles of the body with which it is brought into contact, and for which it possesses a strong adhesion, that the whole mass becomes petrified. If, therefore, a body does not readily cement with water-glass, it will only be necessary to add a material which combines chemically with the latter, when the desired end is sure to be obtained.

I call a mixture of pulverulent or sand-like bodies with water-glass which cements well, *water-glass cement*. It may be advantageously employed in various cases instead of the common chalk-cement, as will be shown hereafter.

Water-glass imparts considerable hardness to porous bodies which absorb it, such as vessels of baked clay, plates, bricks, tiles, pottery-ware, &c.; as also to porous limestones, sandstones, and to timber.

It has been stated that water-glass does not cement all solid bodies equally well, and it will be interesting to know which bodies are more or less inclined to combine with it. I will mention only those which are available for practical purposes, and state the experiments which were made to ascertain their deportment.

(*To be continued.*)

THE EFFECTS OF MERCURY ON THE LABOURERS IN THE QUICKSILVER WORKS OF IDRIA.

According to the statements of Dr. Görbez, physician at Idria, out of 516 workmen, occupied partly in mining, partly in smelting, and partly in the cinnabar manufactory, 122 were in 1856 effected with dyspepsia, ptyalism, scrofula, anæmia, neuralgia, mercurial gout, mercurial tremor, and caries. The labour is divided among the miners in such a manner that fifty-nine men, who are changed monthly, are assigned to the smelting-houses, and nine to the cinnabar manufactory. The occupation in the shaft consists in procuring the ore; in the smelting-house, the ore is heated in the furnace, and the quicksilver is reduced to the metallic state; the cinnabar is obtained by subliming the æthiops mineral. Idria itself possesses favourable climatic and social conditions, and its high mortality (120 annually out of 4500) and the evident sickliness of its entire population, are to be ascribed to the influence of the quicksilver. The immediate action of the mercury takes place, according to the author, in the first instance from the fine dust containing quicksilver (from the sweeping of the tubes, &c.), which becomes deposited on the mucous membrane of the mouth and the outer integuments, and produces intoxication. To what an extent this may occur is most plainly proved by the fact that not unfrequently globules of quicksilver are found in the bathing-tubes which have been used. Intercommunication between the affected workmen and the rest of the population, and the air of the valley impregnated with the mercurial vapours, are additional sources of disease. In the second place, particles of dust and vapour are imbibed through the organs of respiration and digestion. This injurious influence extends also to *animals*; thus cows, which feed in the neighbourhood of the furnaces, suffer from ptyalism, become cachectic and abort; the calves themselves are sick; trout, too, which are kept in reservoirs in Idria, lose their red spots when hot scoria are thrown into the river. As prophylactics against hydrargyrosis, the author recommends an instrument, similar to a respirator, for closing the mouth, new milk, cod-liver oil, chewing tobacco or sage, frequent baths, and change of the workmen's clothes; as remedies, iodide of potassium and diaphoretics, and fresh, pure air. As to iodide of potassium, according to the experience of Dr. Guillot and Professor Melsen, it enters into double combinations with all compounds of mercury which can possibly be met with in the animal body, and affords as good a remedy, as it does a valuable preservative, against poisoning with quicksilver. Iodide of mercury can be detected in the urine of those affected with hydrargyrosis who have been treated with iodide of potassium.—*The Dublin Quarterly Journal of Medical Science.*

ON LEAD-POISONING WITH SNUFF.

BY W. WICKE.

To the cases of lead-poisoning with snuff which have lately been made known, Dr. Alfter has just added a new one in Nos. 10 and 11 of the *Medicinisch Zeitung*, published by the Medical Society of Prussia. We may here pass over the morbid phenomena produced. The violent attacks of colic experienced by the patient first awakened the suspicion that it was a case of poisoning by lead. However, no source could be found for the poison except the snuff which the patient consumed in large quantities. He had constantly taken the same kind for seven years. Höckel examined the snuff, and found that it contained $2\frac{1}{2}$ per cent. of lead. He supposes that a lead-liquor had probably been added to the snuff.

The author has always found that the snuff which is packed in lead-foil contains lead. The longer it has been kept the greater is the amount of lead. Samples sent in bottles or jars always proved free of lead, or contained that metal only in such small quantities as could not be determined by weighing.

The ordinary samples of snuff are firmly-pressed, longish quadrangular cakes, which are first wrapped in lead-foil and then in a double envelope of paper. The outer covering is usually thick blue paper ; the inner one finer and often of a yellow colour. On opening one of these packets the inner paper is usually found to be very damp, the lead superficially oxidized, but in many places much corroded. These spots especially have a crust of a whitish salt. The paper also, even the outer blue coat now and then, exhibits white chalk-like points. Lastly, the cake, especially when dried, appears to be covered with a white granular saline coat, somewhat resembling mould. This white substance is in all cases carbonate of lead.

Keeping snuff in damp places, especially in cellars, must contribute greatly to its becoming poisonous. The samples examined by the author still contained more than 42 per cent. of moisture, Tobacco, as a humous substance, is a source of carbonic acid, without taking into consideration the fact that the air in cellars may itself be richer than ordinary in carbonic acid. The carbonate of lead produced is carried into the cake itself by the moisture. That this is the course taken by the salt is shown by the observation, that the cake contains less lead the further we go from the surface.

Analysis gave for the inner mass 0.951 per cent. of carbonate of lead, for the outer crust 2.743 per cent. ; whilst the paper which had been in immediate contact with the lead-foil gave 1.638 per cent.

The lead-foil is certainly tinned on one side. But this is an insufficient protection ; and it becomes a perfectly superfluous precaution, when, as was repeatedly observed by Wicke, the tin coat has been turned outwards by the carelessness of the packers. But even when this is not the case, the tin is eaten through, and a free communication between all parts is set up, That the mischief is produced by packing in lead also appears from the fact, that at the edges of the cake, where the contact with the envelope was most complete, the deposit of carbonate of lead was also the greatest.

In poisoning with snuff containing lead absorption may possibly assist, but Wicke regards it as more probable that it takes place principally from the stomach. It is well known that in snuff-takers the pharynx is very often coated with snuff. Thus small quantities of carbonate of lead will be constantly reaching the stomach. At the same time the mode of taking snuff, the greater or less force with which the snuff is drawn up, may also have some influence.—*Zeitschrift für rationelle Medicin.*, p.195.

MISCELLANEA.

Appointments.—Robert Bentley, F.L.S., M.R.C.S., A.K.C., Professor of Botany and Materia Medica to the Pharmaceutical Society of Great Britain, has been appointed Professor of Botany in King's College, London, in succession to the late Professor Henfrey.

The Chair of Pharmacy of the Faculty of Medicine of Paris having become vacant by the death of M. Soubeiran, the opportunity has been taken to organize the professorship upon a new and broader basis. By an imperial decree, dated November 13, 1859, the Chair of Pharmacy is henceforth to take the title of Chair of Pharmacology; and by the same decree Mr. J. Regnauld, Doctor of Medicine and of Sciences, Pharmacien of the first class, &c., is named Professor of Pharmacology to the Faculty of Medicine of Paris.

Poisoning of Horses and Sheep.—Mr. Singlehurst, a farmer of Firbeck, has sustained a loss of thirty-three sheep, three horses, and two pigs from poison. On Dec. 21st, a large number of the stock were found dead, and from the fact that a violent storm had taken place, it was at first attributed to the electric fluid; but it has been proved beyond doubt that they died from poison. A letter, bearing the London post-mark, has been received by Mr. Singlehurst, expressing the writer's joy at the loss, and wishing it might be doubled.

Mr. T. Pateman, farmer, of Uffingham, had been in the habit of giving his horses alterative powders to keep them in condition, and the usual quantity of powder was administered on Dec. 29th. It was soon discovered that arsenic had been given by mistake in the mash, instead of the alterative powders. The usual remedies were

applied by a veterinary surgeon, but four of the horses died, and it was thought the remaining five that had partaken of the mash would not recover.

Arsenic in Paper-Hangings.—Three of the children of Mr. H. Fulland, living at the Quarry, Sheepcotwall, near Tipton, have been all but poisoned. On removing to a new house the children became strangely and unaccountably ill. They all appeared suffering from the same complaint, nor could they well explain how they felt. At nights they were worse than in the daytime, and always very restless, the muscles of the face being marked by a kind of twitching. Medical assistance was procured, but without effect, until Dr. Ballenden discovered that they were suffering from the effects of poison continuously received into their system, but from what source he could not ascertain. He, however, subsequently examined the bedroom, and finding the walls covered with a green-coloured paper, tore off a small piece, in which he discovered an extraordinary quantity of arsenic. The room had just been papered, and a fire was kept in it. The children had, therefore, been inhaling the deleterious evaporation which necessarily issued from the paper. They were removed into another room, and are now fast regaining their usual health. The doctor states that, from an analysis made, a small bit of the paper contained sufficient arsenic to poison any grown up person.—*Manchester Guardian.—Times*, Jan. 25.

Poisoning from Inhalation of Aconite Dust.—Dr. Isaacs related to the King's County Medical Society the case of an apothecary's clerk poisoned by the inhalation of the dust of aconite root which he was pulverizing. The effects of the drug were first manifested by numbness of the tongue and difficulty of swallowing, with dryness and sense of constriction of the fauces. About an hour afterwards there was some difficulty of respiration with diminution of force and frequency of the pulse, greatly dilated pupils, loss of voice and prostration. Very slight convulsions occurred at repeated intervals for about five hours, during which time he was supposed to be dying. Countenance hippocratic, pupils very much dilated, pulse 36, and feeble, respiration correspondingly slow. There was from the first great oppression in the cardiac region. The treatment consisted in the administration of stimuli, with the occasional application of frictions, sinapisms, &c. Two weeks after the attack the aphonia continued.—*New York Journal*, vol. vii., p. 192.—*Medical Times and Gazette.*

Poisoning by Hydrochloric Acid and Chloride of Zinc.—Last week a girl was admitted into the London Hospital who had swallowed about two ounces of the following solution:—Hydrochloric acid four ounces, water four ounces, chloride of zinc one ounce. She died about eighteen hours after drinking the poison. The antidote used was magnesia given in milk at frequent intervals.—*Ibid.*

Effects of Fat in Poisoning by Arsenic.—Dr. Blondlot has communicated, in a paper to the Paris Academy of Sciences, a fact which may be highly valuable in cases of poisoning by arsenic. After numerous experiments, he has come to the conclusion that the slightest quantity of greasy matter in contact with arsenious acid will reduce its solubility to about one-twentieth of what it was before. This explains at once why, in certain judicial investigations, arsenic has been sought for in vain in the liquid portion of the food contained in the stomach, when the food partly consisted of fatty substances, such as broth, milk, &c. It likewise explains how arsenious acid, taken in powder, may sometimes have sojourned a long time in the stomach before it produced any deleterious effect, since in such cases its action was hindered by the presence of fatty substances. Jugglers have been seen swallowing arsenic with impunity, because, according to Dr. Blondlot, they had previously taken the precaution to drink milk and eat fat bacon. Hence it follows that in cases of poisoning by arsenic, fatty substances may be administered as real antidotes, capable of suspending the action of the poison for a considerable time, until more radical means of effecting a cure can be applied.

Pencils of Tannin for Affections of the Uterus.—Becquerel has recommended the following mode of applying tannin in certain affections of the uterus, in which cases it has been found very useful:—

Take of Tannin, 4 parts
Gum tragacanth, 1 part
Crumb of bread, sufficient to give the required consistence for forming pencils, which are made about one inch in length and one-fifth, of an inch in diameter.

ROYAL INSTITUTION.

The usual Friday evening Meetings at this Institution were commenced on the 20th of January,

SIR B. C. BRODIE, BART., PRESIDENT OF THE ROYAL SOCIETY, &c.,

In the chair, when the following discourse was delivered by John Tyndall, Esq., F.R.S.:—

ON THE INFLUENCE OF MAGNETIC FORCE ON THE ELECTRIC DISCHARGE.

The intention of the speaker was to bring before the meeting a series of experiments illustrative of the constitution of the electric discharge and of the action of magnetism upon it. The substance of the discourse was derived from the researches of various philosophers, its form being regulated to suit the requirements of the audience.

1. The influence of the transport of particles was first shown by an experiment suggested, it was believed, by Sir John Herschel, and performed by Professor Daniell. The carbon terminals of a battery of 40 cells of Grove were brought within one-eighth of an inch of each other, and the spark from a Leyden jar was sent across this space. This spark bridged with carbon particles the gap which had previously existed in the circuit, and the brilliant electric light due to the passage of the battery current was immediately displayed.

2. The magnified image of the coal points of an electric lamp was projected upon a white screen, and the distance to which they could be drawn apart without interrupting the current was noted. A button of pure silver was then introduced in place of the positive carbon, a luminous discharge four or five times the length of the former being thus obtained. The silver was first observed to glow, and afterwards to pass into a state of violent ebullition. A narrow dark space was observed to surround one of the poles, corresponding probably with the dark space observed in the discharge of Ruhmkorff's coil through rarefied media.*

3. The action of a magnet upon the splendid stream of green light obtained in the foregoing experiment was exhibited. A small horseshoe magnet of Logemann was caused to approach the light, which was bent hither and thither, according as the poles of the magnet changed their position : the discharge in some cases formed a magnificent green bow, which on the further approach of the magnet was torn asunder, and the passage of the current thereby interrupted. It was Davy who first showed the action of a magnet upon the voltaic arc. The transport of matter by the current was further illustrated by a series of deposits on glass obtained by Mr. Gassiot from the continued discharge of an induction coil.

4. A discharge from Ruhmkorff's coil was sent through an attenuated medium ; and the glow, which surrounded the negative electrode was referred to. One of the most remarkable effects hitherto observed was that of a magnet upon this negative light. Plücker had shown that it arranges itself under the influence of the magnet exactly in the direction of the magnetic curves. Iron filings strewn in space, and withdrawn from the action of gravity, would arrange themselves around a magnet exactly in the manner of the negative light.

An electric lamp was placed upon its back ; a horseshoe magnet was placed horizontally over its lens, and on the magnet a plate of glass : a mirror inclined at an angle of 45° received the beam from the lamp, and projected it upon the screen. Iron filings were scattered on the glass, and the magnetic curves thus illuminated were magnified, and brought to clear definition upon the screen. The negative light above referred to arranges itself, according to Plücker, in a similar manner.

5. The rotation of an electric current round the pole of a magnet, discovered by Mr. Faraday in the Royal Institution, nearly forty years ago, was next shown ; and the rotation of a luminous current from an induction coil in an exhausted receiver by the same magnet was also exhibited, and both shown to obey the same laws.

6. Into a circuit of 20 cells a large coil of copper wire was introduced, and when the current was interrupted, a bright spark, due to the passage of the extra current, was obtained. The brightness and loudness of the spark were augmented when a core of soft iron was placed within the coil. The disruption of the current took place between the poles of an electro-magnet ; and when the latter was excited, an extraordinary

* Mr. Faraday noticed this dark stripe while the speaker was making his preparatory experiment.

augmentation of the loudness of the spark was noticed. This effect was first obtained by Page, and was for a time thought to denote a new property of the electric current.

But Rijke had shown in a paper, the interest of which is by no means lessened by the modesty with which it is written, that the effect observed by Page is due to the sudden extinction of the primary spark by the magnet; which suddenness concentrates the entire force of the extra current into a moment of time. Speaking figuratively, it was the concentration of what, under ordinary circumstances, is a mere push, into a sudden kick of projectile energy.

7. The contact-breaker of an induction coil was removed, and a current from five cells was sent through the primary wire. The terminals of the secondary wire being brought very close to each other, when the primary was broken by the hand, a minute spark passed between the terminals of the secondary. When the disruption of the primary was effected between the poles of an excited electro-magnet, the small spark was greatly augmented in brilliancy. The terminals were next drawn nearly an inch apart. When the primary was broken between the excited magnetic poles, the spark from the secondary jumped across this interval, whereas it was incompetent to cross one-fourth of the space when the magnet was not excited. This result was also obtained by Rijke, who rightly showed, that in this case also the augmented energy of the secondary current was due to the augmented speed of extinction of the primary spark between the excited poles. This experiment illustrated in a most forcible manner the important influence which the mode of breaking contact may have upon the efficacy of an induction coil.

The splendid effects obtained from the discharge of Ruhmkorff's coil through exhausted tubes were next referred to. The presence of the coil had complicated the theoretic views of philosophers, with regard to the origin of those effects; the intermittent action of the contact-breaker, the primary and secondary currents, and their mutual reactions, producing tertiary and other currents of a higher order, had been more or less invoked by theorists, to account for the effects observed. Mr. Gassiot was the first to urge, with a water battery of 3500 cells, a voltaic spark across a space of air, *before* bringing the electrodes into contact; with the self-same battery he had obtained discharges through exhausted tubes, which exhibited all the phenomena hitherto observed with the induction coil. He thus swept away a host of unnecessary complications which had entered into the speculations of theorists upon this subject.

8. On the present occasion, through the kindness of Mr. Gassiot, the speaker was enabled to illustrate the subject by means of a battery of 400 of Grove's cells. The tension at the ends of the battery was first shown by an ordinary gold-leaf electroscope; one end of the battery being insulated, a wire from the other end was connected with the electroscope; the leaves diverged; on now connecting the other end of the battery with the earth, the tension of the end connected with the electrometer rose, according to a well-known law, and the divergence was greatly augmented.

9. A large receiver (selected from Mr. Gassiot's own collection), in which a vacuum had been obtained by filling it with carbonic acid gas, exhausting it, and permitting the residue to be absorbed by caustic potash, was placed equatorially between the poles of the large electro-magnet. The jar was about six inches wide, and the distance between its electrodes was ten inches. The negative electrodes consisted of a copper dish, four inches in diameter, the positive one was a brass wire.

On the 16th of January an accident occurred to this jar. Mr. Faraday, Mr. Gassiot, and the speaker had been observing the discharge of the nitric acid battery through it. Stratified discharges passed when the ends of the battery were connected with the electrodes of the receiver; and on one occasion the discharge exhibited an extraordinary effulgence; the positive wire emitted light of dazzling brightness, and finally gave evidence of fusion. On interrupting the circuit, the positive wire was found to be shortened about half an inch, its metal having been scattered by the discharge over the interior surface of the tube.

10. The receiver in this condition was placed before the audience in the position mentioned above. When the ends of the 400-cell battery were connected with the wires of the receiver, *no discharge passed*; but on touching momentarily with the finger any portion of the wire between the positive electrode of the receiver and the positive pole of the battery, a brilliant discharge instantly passed, and continued as long as the connexion with the battery was maintained. This experiment was several times repeated: the connexion with the ends of the battery was not sufficient to produce the discharge, but in all cases the touching of the positive wire caused the discharge to flash through the receiver.

Previous to the fusion of the wire above referred to, this discharge usually exhibited fine stratification: its general character now was that of a steady glow, through which, however, intermittent luminous gushes took place, each of which presented the stratified appearance.

11. On exciting the magnet between whose poles the receiver was placed, the steady glow curved up or down according to the polarity of the magnet, and resolved itself into a series of effulgent transverse bars of light. These appeared to travel from the positive wire along the surface of the jar. The deflected luminous current was finally extinguished by the action of the magnet.

12. When the circuit of the magnet was made and immediately interrupted, the appearance of the discharge was extremely singular. At first the strata rushed from the positive electrode along the upper surface of the jar, then stopped, and appeared to return upon their former track, and pass successively with a deliberate motion into the positive electrode. They were perfectly detached from each other; and their successive engulphments at the positive electrode were so slow as to be capable of being counted aloud with the greatest ease. This deliberate retreat of the strata towards the positive pole was due, no doubt, to the gradual subsidence of the power of the magnet. Artificial means might probably be devised to render the recession of the discharge still slower. The rise of power in the magnet was also beautifully indicated by the deportment of the current.

After the current had been once quenched, as long as the magnet remained excited, no discharge passed: but on breaking the magnet circuit, the luminous glow reappeared. Not only then is there an action of the magnet upon the particles transported by an electric current, but the above experiment indicates that there is an action of the magnet upon the electrodes themselves, which actually prevents the escape of their particles. The influence of the magnet upon the electrode would thus appear to be *prior* to the passage of the current.

13. The discharge of the battery was finally sent through a tube, whose platinum wires were terminated by two small balls of carbon: a glow was first produced; but on heating a portion of the tube containing a stick of caustic potash, the positive ball sent out a luminous protrusion, which subsequently detached itself from the ball; the tube becoming instantly afterwards filled with the most brilliant strata. There can be no doubt that the superior effulgence of the bands obtained with this tube is due to the character of its electrodes: *the bands are the transported matter of these electrodes.* May not this be the case with other electrodes? There appears to be no uniform flow in nature; we cannot get either air or water through an orifice in a uniform stream; the friction against the orifice is overcome by starts, and the jet issues in pulsations. Let a lighted candle be quickly passed through the air; the flame will break itself into a beaded line in virtue of a similar intermittent action, and it may be made to sing, so regular are the pulses produced by its passage. Analogy might lead us to suppose that the electricity overcomes the resistance at the surface of its electrode in a similar manner, escaping from it in tremors; the matter which it carries along with it being broken up into strata, as a liquid vein is broken into drops.

ROYAL COLLEGE OF SURGEONS AND THE DENTAL PROFESSION.

The dental profession, and indeed the public generally, will be glad to learn that the Crown having, in pursuance of the provisions in the Medical Act, granted a charter to the above institution, empowering it "to institute and hold examinations for the purpose of testing the fitness of persons to practise as dentists, and to grant certificates of such fitness;" and directing that "the Board of Examiners in Dental Surgery shall consist of six members, three of whom shall be members of the Court of Examiners of the College, and three others of them shall be persons skilled in dental surgery;" the Council of the College of Surgeons having established the bye-laws and regulations necessary for carrying out such examinations, met on Saturday, the 18th inst., when the following gentlemen were elected members of the Board of Examiners in Dental Surgery—viz. Mr. William Lawrence, F.R.S., Serjeant-Surgeon to the Queen; Mr. Joseph Henry Green, F.R.S.; Mr. James Moncrieff Arnott, F.R.S., President of the Royal College of Surgeons, Surgeon in Ordinary to his Royal Highness the Prince Consort; Mr. Thomas Bell, F.R.S., Lecturer on Dental Surgery to Guy's Hospital; Mr. John Tomes, F.R.S., Surgeon-Dentist to the Middlesex Hospital; and Mr. Arnold Rogers, F.R.C.S., Consulting Surgeon-Dentist to St. Bartholomew's Hospital.—*Times*, 22nd February.

A BILL FOR PREVENTING THE ADULTERATION OF ARTICLES OF FOOD OR DRINK.

Prepared and brought in by Mr. Scholefield, Mr. Wise, and Mr. Villiers, 31st January, 1860.

Whereas the practice of adulterating articles of food and drink for sale, in fraud of Her Majesty's subjects, and to the great hurt of their health, requires to be repressed by more effectual laws than those which are now in force for that purpose: Be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

I. Every person who shall sell any article of food or drink with which, to the knowledge of such person, any ingredient or material calculated to injure the health of persons eating or drinking such article has been mixed, and every person who shall sell warranted as pure and unadulterated any article of food or drink which, to the knowledge of such person, is adulterated and not pure, shall for every such offence, on a summary conviction of the same before two justices of the peace, forfeit and pay a penalty not exceeding pounds nor less than shillings, together with such costs attending such conviction as to the said justices shall seem reasonable; and if any person so convicted shall afterwards commit the like offence, it shall be lawful for such justices to cause such offender's name, place of abode, and offence to be published, at the expense of such offender, in such newspaper or in such other manner as to such justices shall seem desirable.

II. On the hearing by the justices of any complaint under this Act the purchaser shall prove to the satisfaction of such justices that the seller of the article of food or drink alleged to be adulterated, or his servants, had such notice of the intention of the purchaser to have such article analyzed, and also such opportunity of accompanying the purchaser to an analyst appointed by this Act, as the justices shall think reasonable, in order to secure such article from being tampered with by the purchaser.

III.—The vestries and district boards acting in execution of the Act for the better local Management of the Metropolis, and the town council of every municipal borough, may, for their respective districts or boroughs, appoint one or more persons possessing competent medical, chemical, and microscopical knowledge as analysts of all articles of food and drink purchased within the said metropolitan districts or boroughs, and may provide a convenient office, and all necessary accommodation and materials, for the execution of the duties of such analysts, and may pay to such analysts such salary or allowances as they may think fit.

IV. Any purchaser of any article of food or drink in any district or borough where there is any analyst appointed under this Act shall be entitled, on payment of a sum not less than two shillings and sixpence, nor more than ten shillings and sixpence, to have any such article analyzed by any analyst who may be appointed for such district or borough, and to receive from such analyst a certificate of the result of his analysis, specifying whether in his opinion such article is adulterated, and also whether it is so adulterated as to be injurious to the health of persons eating or drinking the same; and such certificate shall, in the absence of any evidence to the contrary, be sufficient evidence before the justices or in any court of justice of the matters therein certified and the sum so directed to be paid for such certificate shall be deemed part of the costs attending a conviction under this Act.

V. The justices before whom any complaint may be made under this Act may, in their discretion, cause any article of food or drink to be examined and analyzed by such skilled person they may appoint for that purpose, who may be required to give evidence of the same at the hearing of the case; and the expense thereof, and of such examination and analysis, if not paid by the complainant or party complained against, shall be deemed part of the expenses of executing this Act, but nevertheless such expense may be ordered by such justices to be paid by the party so complaining or complained against, as they shall think proper.

VI. Any person who has been convicted of any offence punishable by this Act may appeal to the next General or Quarter Sessions of the Peace which shall be held for the city, county, town, or place wherein such judgment or conviction shall have been made, provided that such person enter into a recognizance within two days next after such conviction, with two sufficient sureties, conditioned to try such appeal, and to be forthcoming to abide the judgment and determination of the

justices at such General or Quarter Sessions, and to pay such costs as shall be by such last-mentioned justices awarded; and the justices before whom such conviction shall be had are hereby empowered and required to take such recognizance; and the justices at such General or Quarter Sessions are hereby authorized and required to hear and finally determine the matter of every such appeal, and they may, according to their discretion, award such costs to the party appealing or appealed against as they shall think proper.

VII. If any such conviction or judgment or order of forfeiture shall happen to be made within six days before any General or Quarter Sessions of the Peace shall be held for the city, county, town, or place wherein such conviction shall have been made, the person who shall think himself aggrieved by any such conviction may, on entering into a recognizance in manner and for the purposes before directed, be at liberty to appeal either to the then next or next following General or Quarter Sessions of the Peace which shall be held for any such city, county, town, or place wherein any such conviction shall have been made.

VIII. The provisions in the Nuisances Removal Act for England, 1855, as to procedure, and the provisions of the Act of the 11th and 12th years of the reign of her present Majesty, intituled, "An Act to facilitate the Performance of the Duties of Justices of the Peace and of Session, within England and Wales, with respect to summary Convictions and Orders," so far as the same are respectively applicable, shall extend and apply to cases arising under this Act; and all moneys arising from penalties under this Act in any district or borough where there are analysts appointed under this Act shall, when paid or recovered, be paid to the vestry, district board, or town council for such district or borough respectively, to be applied for the general purposes of such vestry, district board, or borough respectively.

IX. The expense of executing this Act shall be borne, in the metropolis, out of any rates or funds applicable to the purposes of the Act for the better local Management of the Metropolis, and in boroughs out of the borough fund.

X. In the construction of this Act the words "articles of food or drink" shall (if not inconsistent with the context or subject matter) include not only all alimentary substances, whether solids or liquids, but also all eatables and drinkables whatsoever not being medical drugs or articles usually taken or sold as medicines, but this Act shall not be construed so as to affect the ordinary reduction of the strength of Foreign, British, or Colonial spirits by persons licensed and paying duties under the Excise.

XI. This Act shall not extend to Scotland or Ireland.

BOOKS RECEIVED.

THE MEDICAL AND SURGICAL REPORTER. A Weekly Journal. Edited by S. W. BUTLER, M.D., and R. J. LEVIS, M.D. Philadelphia: Crissy and Markley, printers. 1859. (6 Nos.)

THERAPEUTICS AND MATERIA MEDICA; *A Systematic Treatise on the Action and Uses of Medicinal Agents, including their Description and History.* By ALFRED STILLÉ, M.D., late Professor of the Theory and Practice of Medicine in the Medicinal Department of Pennsylvania College, &c. &c. 2 vols., 8vo. Philadelphia: Blanchard and Lea. 1860.

TO CORRESPONDENTS.

J. O. (Peterborough).—(1). The label referred to would render the article liable to stamp duty. (2). A storm-glass consists of a glass tube, about twelve inches long and three-quarters of an inch in diameter, about three-fourths filled with the following solution:—Camphor, ʒij.; nitrate of potash, ʒiss.; sal ammoniac, ʒij.; proof spirit, ℥ij.

W. H. B. (North Shields).—Aromatic confection, when made according to the London Pharmacopœia, and kept in the dry state, as there directed, should have the yellow colour referred to.

T. (Amble).—By examination only; apply by letter to the Secretary.

O. O.—A Patent Medicine Licence is required in the case alluded to.

A Correspondent (Sandgate) suggests that, in order to make the public full aware of the poisonous nature of many articles commonly sold, a label similar to the following should, in such cases, be affixed to the article:—

CAUTION

As the Sale of all Poisonous Substances is attended with great risk, it is earnestly requested that this Preparation may be kept away from Children, and not where Food, &c., is deposited.

"*Excelsior*" (Lutterworth).—The *Minor Examination* comprises the Latin language, Pharmaceutical and General Chemistry, the Chemistry of Poisons, Materia Medica, the Natural History of Drugs, and Botany. For particulars, apply by letter to the Secretary, 17, Bloomsbury Square.

D. (Brighton).—(1.) Registered Apprentices are entitled to free admission to the lectures. (2.) A saturated solution.

W. D. D. (Birmingham).—The paper by Dr. Pereira on Conium, &c., will be found in the second vol. of this Journal, p. 337.

W. P. (Nailsea).—There is no authorized formula for *Liquor Opii Sedativus* published. A similar preparation is sometimes made by dissolving ℥iij. of hard extract of opium (prepared by percolation with temperate water) in ℥xxx. of boiling distilled water, and adding to the cold and filtered solution ℥vi. of rectified spirit, and water to make up exactly Oij.

G. H. (Birmingham).—The British Pharmacopœia is expected to appear shortly.

A. P. S. (Manchester).—The effervescence alluded to was probably due to some acidity in the preparation of sarsaparilla.

J. B. (Chepstow) wishes for a formula for a preparation sold under the name of "Dale's Ointment."

A Member (London).—*Marking Ink.* Vol. vii., p. 183.

R. A. P. S. (Brighton).—Lindley's *Elements of Botany*, price 12*s.*; or Balfour's *Outlines of Botany*, price 5*s.* 6*d.* Both the above works contain a Botanical Glossary. The Glossary of Lindley's *Elements* may be purchased separately, price 5*s.*

Pomona (Maidstone).—There is a perfect copy of Gerarde's *Herbal*, as enlarged by Johnson, in the library of the Pharmaceutical Society. Mr. Pamplin, of Frith Street, Soho, will supply the above work at about £2 2*s.*; and the same, somewhat damaged, and without the title page, but with the body of the work perfect, at 18*s.*; or the same, with title-page, but a portion of the index wanting, at 21*s.*

Chemicus.—We are unable to give the information required.

Morgan.—(1). Yes. (2). Yes.

Doubtful.—We think it very unlikely, and not impossible.

A Member (Northampton).—We cannot give the required information.

A Subscriber (Leamington).—Parnell's or Fresenius's *Analysis.*

Granular Citrate of Magnesia.—Mr. Bishop wishes us to state that his name has been used by a Correspondent in last month's Journal in connexion with the above preparation, without his authority.

Communications are received from Messrs. T. and H. Smith, of Edinburgh; Mr. Wilkinson, of Manchester; and Mr. Atkinson, of Leeds, for which we are unable to find space this month.

Addenda to the Present Number.—Page 448, line 5 from bottom, insert after body (Figs. 1 and 2, A A, *b b*) and after the word shape (Figs. 1 and 2, B B, *b b*). Page 449, line 9 from top, insert after convex (Figs. 3 and 4, B B, *b b*), and line 10 from top, after head (Figs. 3 and 4, A A, *b b*).

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. X.—APRIL 2nd, 1860.

PHARMACEUTICAL QUALIFICATION.

The necessity for high professional qualification bears a close relation to the importance of the interests affected by the exercise of professional duties. When these duties are of a very responsible nature, it becomes imperative that those who undertake them should be fully qualified; and in such cases it is not unreasonable to expect that some guarantee to that effect should be required by the public. Admitting the responsible character of the duties of the Pharmaceutist, and the great importance of the interests affected by the manner in which they are performed, it is not demanding too much to require that those who are entering the profession of Pharmacy should take a high position in reference to qualification.

It has been one of the principal objects of the Pharmaceutical Society to raise and to maintain the standard of qualification among those who are engaged in the practice of Pharmacy. All agree here in admitting the necessity for a high standard of qualification, but, as may naturally be supposed, some difference of opinion exists as to the extent and the nature of the qualifications considered most consistent with the requirements of the medical profession and the public, and most conducive to the success which all men of business have a right to expect. While the Society continues from year to year with increased energy and success to urge upon Pharmaceutical students the necessity for a competent knowledge of several branches of science, included in the subjects on which candidates for the title of Pharmaceutical Chemist are examined, there are those who still contend that the men who in this respect are the most highly educated, are not always the best assistants, nor the most likely to succeed as men of business. Reference is often made to individual cases which appear to support this opinion, but although not prepared to say that it is entirely devoid of foundation, we think the argument as usually urged is founded upon a partial consideration of the subject.

There are many points to be considered in reference to the qualifications of the Pharmaceutist. These qualifications are partly physical and partly mental, they involve a suitable development of body as well as mind. Personal activity and expertness of manipulation are important qualities, which must not be overlooked. Much, no doubt, may often be done in spite of natural or acquired defects. Thus we have known a Pharmaceutist who, although deprived of one arm, succeeded in acquiring considerable expertness in many operations, even in dispensing. On the other hand, how difficult it is to deal with a set of fingers which may be compared to sausages. Everything slips through them, and nothing goes to its right place. Yet such physical defect may be associated with an intelligent and active mind, well stored with all the knowledge requisite for an accomplished Pharmaceutist.

In regard to mental qualifications, there are natural differences in the development of mind as great as those existing in reference to the body. But it is here the greatest difference is usually observed in the effects of cultivation or training. This constitutes the most important part of the education of youth, and, in the case to which we are referring, may be supposed to extend to the period of manhood. The education of the Pharmaceutist may be referred to three periods In the first place, we have his education at school. Is it all

school learning that will equally fit him for his subsequent duties as a Pharmaceutist? or should his training here be regulated with reference to the knowledge he will require in the business for which he is intended? He might be instructed most thoroughly in the knowledge of his own language, in arithmetic, geography, history, and even in the knowledge of some of the foreign living languages, yet if Latin were omitted, his education would be very deficient as a basis for his intended professional studies. From the very commencement of his apprenticeship as a Pharmaceutist he would daily feel the defect of his school education as a preparation for his business occupations. Yet with regard to the subjects which had been taught him he might be an accomplished scholar, and his qualifications would probably be ample and well adapted for most other commercial occupations. The omission of one branch of school learning would entirely disqualify him for the profession of Pharmacy. Some of the other branches of his learning might have been omitted, but this cannot be. A knowledge of Latin is essential to the Pharmaceutist, and a little Greek would be of use to him, for not only is Latin the language of medical prescriptions, but scientific terms are generally derived from Latin and Greek. He need not be thoroughly versed in the classics, nor have a high university education; this, in fact, might prove a hindrance rather than otherwise to his steady application to the drudgery of a Druggist's shop, by inducing a belief that he was qualified for something better.

In addition to Latin, the school teaching of the intended Pharmaceutist should, if possible, include physical geography, together with the rudiments of geology and botany. These would form the groundwork for subsequent Pharmaceutical studies. The study of arithmetic should also be carried further than it usually is by the class of boys who become Pharmaceutical students. It is required not only as a commercial qualification, but also to afford the means of making calculations for which the Chemist has constant occasion. The art of calculation should be cultivated as much as possible. A knowledge of algebra would be found very useful, and fractions indispensable.

In the second place, we have the period of apprenticeship. During this time the youth is to be drilled into business habits. He must make himself acquainted with the characters of the substances usually sold by Pharmaceutists, and with all that relates to the preparation and the sale of these articles to the public, as far as the circumstances under which he is placed will admit. His knowledge of Latin will soon be turned to account; his botany and geology should be extended, and he should make all possible progress in the study of chemistry. He will now find the advantage of a little Greek in assisting him to remember and understand many of the terms used in botany and chemistry. The reading and dispensing of prescriptions will form an important part of the art to be acquired by the apprentice, and during the latter portion of his term he should become proficient in the performance of this responsible duty.

The apprenticeship ended, we come to the last period of the education of the Pharmaceutist. His pharmaceutical knowledge is yet incomplete; it would be unreasonable to expect that it should be otherwise. How is he to fill up the blank places in his map of knowledge? He is required to pass examinations in Pharmacy, Botany, Materia Medica, Chemistry, and Toxicology. Even if he should not aspire to the title of Pharmaceutical Chemist, and should be satisfied with the appellation of Chemist and Druggist, he would be expected to know something of these subjects. Would he call himself a Chemist, and yet know nothing of chemistry? Would he call himself a Druggist, a dealer in active and poisonous drugs, and remain ignorant of the natural history, the physical and chemical characters and properties of these substances? Then how much is his knowledge to consist of, and how shall it be ascertained that he has the sufficient quantity? There would probably be no worse judge than himself, yet he may feel that he is deficient, and wish to supply what is wanting. He may pick up his knowledge from time to time piecemeal, and thus supply the

deficiency to some extent; or he may pursue a system of study at home, in which well-selected books and well-devised experiments will enable him to become proficient, and to meet every requirement, as far as knowledge is concerned, of the responsible position he may take in reference to Pharmacy. The task thus imposed upon himself will, nevertheless, be an arduous one; more than ordinary talent and judgment, and much time, will be required for its accomplishment; and at last the public may demur to his assumed qualification, while his neighbour, who has gone a different way to work, with less talent and a smaller expenditure of time, enjoys the privilege of a legally recognized qualification. This advantage is every year causing increased numbers to prepare themselves for examination, by availing themselves of the means provided by the Pharmaceutical Society. The subjects to be dealt with are important, and some of them very comprehensive. They should be studied systematically and with reference to their intended application. This can rarely be done with good effect by mere reading. Experience has abundantly proved that no sort of teaching is so well suited for aiding the student in the study of subjects such as those referred to as lectures. A regular attendance of complete courses of lectures, therefore, constitutes the most approved and usually adopted method of acquiring the requisite knowledge. But lectures alone will not suffice. They must be accompanied by reading, note-making, and self-examinations. There should also be, in reference to Botany, the examination of living plants in the fields or botanical gardens; in reference to Chemistry and Pharmacy, the performance of all such operations in a laboratory as will serve to explain the composition, the properties, and the production of those substances used in medicine, respecting which there was no opportunity for acquiring this information during the apprenticeship; and in reference to Materia Medica, the examination and careful study of specimens, such as are contained in museums, where drugs are exhibited in the various states in which they are met with in commerce. If the student enters upon the study of his subjects in this way, he will find it necessary to devote the whole of his time to it until he has gone through the required courses. This is the most important period of his education, during which his stock of knowledge must be made up at least to the standard fixed by the examiners. Having passed the examination required by law, he is now ready either to take a situation as assistant, or to engage in business on his own account. Is he less likely to be an efficient assistant or successful man of business than he would have been had he limited the amount of his knowledge, or adopted a different method of acquiring it? It may perhaps be said that all his science is of very little practical use, that the time which has been occupied in its acquirement might have been applied to better account, and that the possession of so much knowledge tends to make him dissatisfied with his position and inattentive to the dry uninteresting details of a business. Instances may be referred to which appear to justify such statements, while, on the other hand, reference may be made to men who are considered the very types of good assistants and men of business, and who, nevertheless, have been self-educated and unexamined. It cannot be denied that there are occasionally some grounds for statements of this sort, and the advocates of advanced education must admit that evil may and sometimes does arise from the attention of the student being too much absorbed by questions of high scientific interest, and thus diverted from the consideration of those commonplace details upon which success in business so largely depends. But admitting this to the full extent, it affords no ground of argument against the necessity for high professional qualification in the Pharmaceutical Chemist; it merely raises the question as to what this qualification consists in, and to this we shall return hereafter.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

FINANCIAL STATEMENT—*From 1st January, to 31st December*, 1859.

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	275	9	6
Life Members' Fund:			
29 Life Members' Fees 210 0 0			
Interest 38 19 0			
	248	19	0
Benevolent Fund:			
Subscriptions 54 7 0			
Interest 150 16 4			
Return Income Tax on Interest 39 4 7			
	244	7	11
Government Securities, Interest	162	18	9
Rent	233	10	0
Fees:			
20 Pharmaceutical Chemists 105 0 0			
48 Assistants 199 10 0			
72 Apprentices 151 4 0			
	455	14	0
Subscriptions:			
381 London Members 400 1 0			
1632 Country Members 1713 12 0			
172 Associates 90 6 0			
90 Apprentices 47 5 0			
	2251	4	0
Arrears of Subscriptions	78	15	0
Lecture Fees	49	7	0
Sale of Journals	6	18	0
Balance of Petty Cash due to Secretary	2	6	11
	£4009	10	1

EXPENDITURE.	£	s.	d.
Life Members' Fund:—			
Investment	221	8	0
Benevolent Fund:			
Gratuities	35	5	0
Conversazione 35 10 6			
Pharmaceutical Meetings 13 8 5½			
Repayments 11 0 6			
	59	19	5½
House Expenses	29	4	5
Rent, Rates, Taxes and Insurance (including £50 to Secretary for Rent)	513	6	11
Alterations and Repairs	41	13	8
Fixtures and Fittings	35	14	3
Museum	207	8	2
Laboratory	10	0	0
Library	39	8	6
Furniture	1	7	0
Stationery	10	8	4½
Printing and Engraving	65	6	2
Advertisements	8	14	2
Journals	862	7	5
Journals, Delivery of	171	19	0
Postage	65	0	1
Carriage	1	6	10
Collector's Commission	31	0	3
Travelling Expenses, Country Members	136	7	0
Salary, Secretary	225	0	0
Wages	142	0	0
Gratuity to Mrs. Morris	75	0	0
Pension to late Secretary	150	0	0
Expenses of Society in Scotland	66	16	0
Board of Examiners	73	10	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, &c.	3	18	0
Repayment to Secretary, Petty Cash	5	15	10
Balance in Treasurer's hands	89	5	7
	£4009	10	1

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st day of December, 1859:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	5643	0	2
Benevolent Fund, 3 per Cent. Consols	5134	9	3
Life Members' Fund, 3 per Cent Consols	1620	4	0

At that date there was due from the General Fund
to the Life Members' Fund ... £210 0 0
Do. from the General Fund
to the Benevolent Fund 210 3 11

WILLIAM BOWER,
STEPHEN DARBY,
ARTHUR BOWDLER HILL,
HAMERTON RICHARD PEACOCK,
JAMES B. BARNES,
} AUDITORS.

February 10, 1860.

SUBSCRIBERS TO THE BENEVOLENT FUND, 1859.

	£	s.	d.
Althorp, James, Stamford	0	10	6
Arnold, Edward, Norwich	0	5	0
Ballard, Edwin, Farringdon	1	1	0
Balmer, John, 94, St. John's St. Road	1	1	0
Barry, George, Northampton	0	10	6
Beach, Thomas, Bridport	1	1	0
Bell, Jacob (the late), 338, Oxford Street	1	1	0
Best, John D., 28, Suffolk Street, Pall Mall	1	1	0
Bird, W. L., 42, Castle Street, Oxford Street	0	10	6
Blake, Sandford, and Blake, 47, Piccadilly	1	1	0
Bolton, Thos., Tenterden	0	5	0
Bond, Charles, Leamington	0	5	0
Bond, John, Yarmouth	0	5	0
Boyce, John Pierce, Chertsey	0	5	0
Bradley, John, 21, Belgrave Rd.	0	10	6
Brailey, Charles B., Heavitree.	0	5	0
Carr, Wm. Graham, Berwick	0	5	0
Cartwright, Wm., Newcastle-under-Lyne	0	10	6
Christopher, Wm., Crickhowell	1	1	0
Coles, John, New Road, Camberwell	0	10	6
Cooper, George, Exeter	0	5	0
Cullen, William, Walworth	0	10	6
Cupiss, Fras., Diss	0	10	6
Darby, Stephen, 140, Leadenhall Street	1	1	0
Davies, Charles, 11, Claremont Place, N. Brixton	0	5	0
Davies, Henry E., 43, Wood Street, City	0	10	6
Deane, Henry, Clapham	1	1	0
Eddy, Charles William, 30, Crown Street, Finsbury	1	1	0
Evans, John H., 60, Bartholomew Close	1	1	0
Faulconer, Robert, Walworth	5	5	0
Fisher & Haselden, 18, Conduit Street	1	0	0
Fox, William, 48, Church St., Bethnal Green	0	10	6
Gedge, Wm. S., 77, St. John Street	0	5	0
Glover, George, 19, Goodge St.	1	1	0
Goodbarne, Thomas, 13, Charles Place, Hoxton	0	10	6
Goodwin, John, Lower Clapton	0	10	6
Gorden, Henry, 140, Leadenhall Street	1	1	0
Hills, Thomas H., 338, Oxford Street	1	1	0
Hudson, William B., 27, Haymarket	1	1	0
Hurst, William, T. H., Hempstead	0	5	0
Husband, Matthew, Exeter	0	5	0
Jackson, Thos., Manchester	0	10	6
Kitching, Joseph, 234, Blackfriars Road	1	1	0
Leggett, John Tudway, Wareham	0	5	0
Lescher, Joseph S., 60, Bartholomew Close	1	1	0
May, John, Battersea	0	10	6
Meggeson, George, 61, Cannon Street	0	10	6
Middleton, Francis, 338, Oxford Street	0	10	6
Moore, James Lodge, 1, Craven Street, Westbourne Terrace	0	10	6
Mornement, H. J., Yarmouth	0	2	6
Nind, George, Wandsworth	0	10	6
Noakes, Richard, Brighton	0	10	6
Otter, William, Bloxham	0	5	0
Palk, John, Exeter	0	5	0
Penrose, Arthur W., 7, Amwell Street, Clerkenwell	0	5	0
Pocklington, James, Sydenham	0	10	6
Pollock, Thos., 122, Fenchurch Street	1	1	0
Powell, John, Shaftesbury	0	10	6
Pratt, John, Chichester	0	10	6
Proctor, William B., Newcastle	1	1	0
Ranken, William, Kilmarnock.	1	1	0
Rastrick, Joseph L., Southsea	0	5	0
Rea, Edward, 115, Wardour St.	1	1	0
Rea, James S., 115, Wardour St.	0	5	0
Redfern, John, Ashby-de-la-Zouch	1	1	0
Robinson, James Mowld, Beverley	0	5	0
Sadler, William, 13, Norton Folgate	0	10	6
Shirley, John George, 1, Westbourne Grove, Bayswater	0	10	6
Smith, Nathaniel, Cheltenham.	1	10	0
Smith, Wm. Frederick, Keen's Row, Walworth	0	10	6
Spencer, Charles, Gravesend	1	1	0
Starkie, James, 4, Strand	1	1	0
Tanner, Nicholas, Exeter	0	5	0
Tucker, Charles, Bridport	0	10	6
Warner & Barclay, Fore Street, City	1	1	0
Watlock, John D., Wandsworth	0	10	6
White, Daniel, Park Terrace, Regent's Park	1	1	0

AT A MEETING OF THE COUNCIL, *7th March*, 1860,

Present—Messrs. Bird, Bottle, Brew, Cupiss, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Haselden, Herring, Lescher, Macfarlan, Morson, Sandford, Squire, Standring, and Waugh, the following were elected

MEMBERS.

HIGHBURY .....Nicholson, Frederick
PLYMOUTH .....Essery, William

Stevenson Macadam, Ph.D., F.R.S.E., F.C.S., Lecturer on Chemistry, Surgeons' Hall, Edinburgh, was elected an

HONORARY MEMBER.

MAJOR EXAMINATION, 20*th March.*

Crowe, Thomas Lea .....Hereford
Earle, Francis .....Leeds
Giddings, William H. C.....London
Gilbert, George Fagge .....London
Hickman, William.....Manchester
Keene, John .....Brighton
Sutton, Charles William .....Lincoln

MINOR EXAMINATION.

Brooks, Frederick.....Tunbridge Wells
Evans, John James .....London
Grieves, Austin Stirling .....Ludlow
Ismay, John George V..... .....Bristol
Meadows, Henry .....Gloucester
Merrick, Charles James .....Manchester
Morris, Henry.....Liverpool
Spearing, James .....Southampton
Young, Robert Fisher.....Gringley-on-the-Hill

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Battman, Thomas	.....Mr. Wright.....	.....Manchester
Carty, Michael	.....Mr. Radermacher	.....London
Maine, Philip Buckland	Mr. Wills.....	.....Barnstaple
Morris, William	...Mr. Hardman.....	.....Kirkham
Topliss, Richard.....	Mr. Brearey	.....Douglas
Smith, Thomas Hoskins	.Mr. Rook	.....Sittingbourne

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EXAMINATION IN EDINBURGH, *March 23rd*, 1860.

MAJOR

Hill, William .....Edinburgh
Taylor, Herbert Dawson .....Manchester

REGISTERED APPRENTICE.

NAME.	RESIDING WITH.	ADDRESS.
Brown, James.....	Messrs. Gardner and Ainslie.....	Edinburgh

BOTANICAL PRIZE FOR 1861.

A SILVER COUNCIL MEDAL

Is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May, 1860, and the first day of July, 1861; and should there be more than one collection possessing such an amount of merit as to entitle the collectors to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collection to consist of Phanerogamous plants and Ferns, arranged according to the Natural System of De Candolle, or any other natural method in common use and to be accompanied by lists, arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, or Hooker and Arnott), and to mention the work which he adopts. The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, and certified by his employer, or a Pharmaceutical Chemist known to the collector, to the following effect:—The plants which accompany this note were collected by myself, between the first day of May, 1860, and the first day of July, 1861, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1861, endorsed "Herbarium for Competition for the Botanical prizes."

If required, the collection will be returned after competition, with the exception of that of the successful competitor for the Silver Medal, which will be added to the Herbarium of the Society.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL — (*Continued*).

Amount previously advertised, £1691 10*s.* 0*d.*

	£	*s.*	*d.*
Ackrill, George, Abergavenny	0	10	6
Arnold, Edward, Norwich	1	1	0
Booth, John, Heckmondwicke	1	1	0
Briggs, James, Tipton	1	1	0
Briggs, James Aston, Tipton	0	10	6
Cheetham, Henry, Nottingham	0	10	6
Clay, Dodd, and Case, Liverpool	5	5	0
Constable, Edwin, Birkenhead	0	10	0
Cronshey, James, Thetford	1	1	0
Dallas, E. S., 6, Hanover Square	2	2	0
Davies, John L., Hay	0	10	6
Garnett, Joseph, Newcastle-on-Tyne	0	10	6
Gurney, Samuel, Esq., M.P., 25, Princes Gate, Hyde Park.	21	0	0
Hamilton, John T., Dublin	1	1	0
Huxtable, Messrs. J. and W., 104, St. John Street Road	2	2	0
Jones, John, Aberdare	0	10	6
Oliver, Peter Hurdon, Holsworthy	0	10	0
Oliver, John Gerry, Holsworthy	0	10	0
Pocklington, James, Sydenham	2	2	0
Rea, Edward, 115, Wardour Street	5	5	0
Spencer, William, Monmouth	0	10	6
Tamplin, R. W., F.R.C.S., 33, Old Burlington Street	5	5	0
Tamplin, Mrs., 33, Old Burlington Street	5	5	0
Tunley, John, West Bromwich	1	1	0
Welch and Rayner, Nottingham	1	1	0
Wootton, Alfred C., Luton	0	10	6

PHARMACEUTICAL MEETING.

Wednesday, March 7th, 1860.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced :—

Journal of the Society of Arts. From the Society of Arts.
Photographic Journal. From the Photographic Society.
The Dentist. From the Editor.
Chemical News. From the Editor.
Journal of the Brussels Pharmaceutical Society. From the Society.
Illustrations of the Nueva Quinologia of Pavon, by J. E. Howard. From the Author.
A Specimen of Iodide of Potassium. From Messrs. Boileau and Boyd.

The following papers were read :—

SYRUPUS FERRI PHOSPHATIS.

BY MR. H. SCHWEITZER.

The difficulties experienced in obtaining this syrup, according to the formula published by Mr. Greenish in the *Pharmaceutical Journal*, vol. x., p. 534, the vagueness of this form, and some peculiar properties of the phosphates of iron themselves, induced the writer to try a series of experiments, the result of which he begs to lay before the readers of the *Pharmaceutical Journal*. Before entering into a further discussion on this subject, it may be as well to point out the objections which this syrup usually offers :

1. The syrup is either too acid, or
2. The phosphate of iron is in an insoluble condition ;
3. The syrup, when bright at first, becomes turbid by keeping ; or
4. The permanent clearness is due to the presence of a foreign salt.

In dissolving the dry phosphates of iron of commerce, such as Mr. Greenish's form would lead us to take, we find that a very strong phosphoric acid, usually glacial acid, is required for effecting its solution. Heat, instead of assisting, prevents and even precipitates the once dissolved phosphate of iron.

Moreover, in mixing such a cold, strongly acid solution of the phosphate of iron with the requisite amount of simple syrup, the result will still be found too acid for general use, and, when even bright at first, will soon turn cloudy, and throw part of its iron down.

The addition of dilute sulphuric acid or a citrate of ammonia, soda, or potash, delays, and may even prevent, the precipitation of the phosphate of iron ; but as such an addition has always to bear a proportion to the amount of iron and excess of free phosphoric acid in the syrup, it becomes objectionable, especially as we may arrive at the same result without it.

After various trials, it was found that fresh precipitated moist phosphate of the protoxide of iron gave by far the most uniform and satisfactory results, and at the same time proved that the published formula is either faulty in itself or generally misunderstood, which naturally leads to failures.

To get a clearer insight into the nature of the syrup, such as the originator intended us to make, the writer thought it advisable to obtain a specimen from Mr. Greenish himself, and after an analysis and examination of the same, he thinks it but right to disregard the published formula altogether, and suggest, as he hopes, a more definite mode of making the syrup of phosphate of iron.

The tribasic phosphate of the protoxide of iron, corresponding to the formula $3\,Fe\,O, PO_5$, is that which is recommended for this syrup, according to the following form :—

Take of, ℥iij. sulphate of iron in crystals
℥iij. phosphate of soda in crystals
℥iss. carbonate of soda in crystals
℥iss. of water

Pound the phosphate and carbonate of soda together. When fine, add the sulphate of iron, and continue the pounding, gradually adding the water. Continue the trituration till a uniform blue precipitate is produced, which, when well washed, is thrown on a filter and drained. When measured, this precipitate will be found to occupy rather less than 6 fluid ounces, which quantity is then made up with distilled water. Dissolve these 6 fluid ounces of moist precipitated phosphate of iron in 21 fluid ounces of phosphoric acid of the Pharmacopœia, and filter.

To 5 fluid ounces of this solution add sufficient simple syrup to make the whole up to 14 fluid ounces.

Each fluid drachm of the so prepared syrupus ferri phosphatis contains 1 grain of 3 Fe O, PO_5, and 16 minims of dilute phosphoric acid. The dose of dilute phosphoric acid is, according to Pereira, from 10 minims to 1 fluid drachm diluted with water. The amount of iron in this syrup is even considerably more than was found in the examined sample of the original syrup.

The formation of the phosphate of iron, its subsequent washing, and the addition of the syrup, should all be effected without the application of heat, and the syrup so prepared will be and continue bright, the acidity being by no means objectionable.

The addition of the carbonate of soda in the above process is necessary to save an extra expenditure of phosphate of soda, and ensure, at the same time, the perfect neutralization of the otherwise free sulphuric acid, which would cause a very considerable loss of phosphate of iron. In the present proportions there is still a slight excess of phosphoric acid, which, however, will be more than neutralized by the excess of carbonate of soda, which, giving to the whole an alkaline reaction, ensures as little loss as possible of the newly produced phosphate of iron.

ON THE SYRUP OF SUPERPHOSPHATE OF IRON, &c.

BY MR. SAMUEL GALE.

A SYRUP under this name was introduced to the notice of the Pharmaceutical Society as far back as 1851, by Mr. Greenish, who directs it to be made by adding as much phosphate of iron to a solution of metaphosphoric acid as the latter in a boiling state will take up, and, allowing it to cool; of this compound two scruples are added to an ounce of simple syrup. Now this compound, which has been called biphosphate of iron, is very indefinite, therefore the syrup prepared from it would be liable to the same fault. Another objection is, that you have an opaque syrup with a precipitate forming after a short time, making it necessary to label the bottle, "To be shaken."

In carrying out these experiments, I have tried to gain three points—first, to obtain a syrup that should be definite in strength; secondly, permanently bright; thirdly, easily made. The following is the plan I adopt:—

Take 222 grs. protosulphate of iron
240 grs., or sufficient quantity of phosphate of soda
Sufficient quantity of water
5 oz. dilute phosphoric acid
8 oz. (troy) sugar

Dissolve the sulphate of iron and the phosphate of soda separately, each in 4 oz. water; mix the solutions, and throw the pasty mass formed on a calico filter, and wash well with water; then squeeze the precipitate as dry as possible, and add it to the dilute phosphoric acid. As soon as dissolved, filter the solution (which

will now be found to measure about 6 oz.); in this dissolve the sugar without heat so that the product shall be exactly 12 oz. Each drachm of the resulting product then contains 1 grain of phosphate of iron (3 (Fe O) PO_5), or rather more than $1\frac{1}{4}$ grain of 3 (Fe O) $PO_5 + 8$ HO (the form which Gmelin gives for blue phosphate of iron), with 25 minims of dilute phosphoric acid. This is about equal to 5 grains of the so-called biphosphate of iron.

Syrup of Superphosphate of Iron and Manganese.

This is made in a similar manner to the foregoing:—

Take 124 grs. sulphate of iron
46 grs. sulphate of manganese
240 grs. phosphate of soda (or q. s.)
Sufficient quantity of water
5 oz. dilute phosphoric acid
8 oz. (troy) sugar

Dissolve the sulphates in 4 oz., and the phosphate of soda in a similar quantity of water; mix the solutions, wash the precipitate on a calico filter, and press as before; mix the precipitate with the dilute phosphoric acid, filter, and dissolve the sugar without heat; let the product measure 12 oz. Each drachm then contains $\frac{3}{4}$ grain phosphate of iron (3 (Fe O) PO_5, + 8 HO), $\frac{1}{2}$ grain phosphate of manganese, (3 (Mn O) PO_5 + 7 H O), with 25 minims of dilute phosphoric acid.

Syrup of Superphosphate of Iron, Manganese, and Nickel

may be made in the same manner, by taking

124 grs. sulphate of iron
46 grs. sulphate of manganese
56 grs. sulphate of nickel
240 grs. phosphate of soda (or q. s.)
5 oz. dilute phosphoric acid
8 oz. (troy) sugar

Dissolve the sulphates in 4 oz. and the phosphate of soda in a similar quantity of water; mix the solutions, throw on a calico filter, and wash. Proceed as before, making the product measure 12 oz. Each drachm then contains $\frac{3}{4}$ grain phosphate of iron, $\frac{1}{2}$ grain phosphate of manganese, and $\frac{1}{4}$ grain phosphate of nickel, with 25 minims dilute phosphoric acid.

Syrup of Superphosphate of Iron and Lime

is at the present time frequently ordered, and the plan I have adopted in making it has been to precipitate the phosphate of iron as in the previous syrups; then take a given quantity of phosphate of lime and dissolve in hydrochloric acid, and reprecipitate with ammonia, so as to obtain it in a more soluble state than the dry phosphate.

Take 124 grs. sulphate of iron
142 grs. phosphate of soda (or q. s.)

Dissolve separately, in a small quantity of water, mix the solutions, throw on a filter, and wash the precipitate.

48 grs. phosphate of lime.

Dissolve this in a sufficient quantity of hydrochloric acid, diluted with twice its volume of water; then add ammonia, throw the precipitate on a filter, and wash. Dissolve the above precipitates in 5 oz. dilute phosphoric acid, and add 8 oz. sugar to the clear solution, when each drachm will contain $\frac{3}{4}$ grain phosphate of iron, and $\frac{1}{2}$ grain phosphate of lime, with 25 minims of dilute phosphoric acid.

Syrup of Superphosphate of Iron and Soda.

Take 124 grs. sulphate of iron
142 (or q. s.) phosphate of soda

Dissolve separately, precipitate, and wash. Add this to 5 oz. dilute phosphoric acid, with 48 grains phosphate of soda, and in the clear solution dissolve 8 oz. sugar.

SYRUP OF SUPERPHOSPHATE OF ZINC.

429 grs. sulphate of zinc
480 grs. phosphate of soda
5 oz. dilute phosphoric acid
8 oz. (troy) sugar

Dissolve the sulphate of zinc and phosphate of soda separately, and mix the solutions; collect and wash the precipitate. Add this to the dilute phosphoric acid, then dissolve the sugar; let the product measure 12 oz., when each drachm will contain 2 grains phosphate of zinc, and 25 minims dilute phosphoric acid.

There is one other preparation of the phosphates—namely, the "Syrup of the Pyrophosphate of Iron." In the *Pharmaceutical Journal*, vol. xii., p. 498, there is a process by Soubeiran, which is made by precipitating the persulphate of iron with excess of pyrophosphate of soda, the precipitate being soluble in excess of the precipitant, and dissolving sugar in the solution without heat. But recently M. Robiquet has introduced a more elegant syrup, which consists in first forming what he calls a "Citro-ammoniacal Pyrophosphate of Iron," known in this country as pyrophosphate of iron. His form is the following:—

50 parts sulphate peroxide of iron
84 parts pyrophosphate of soda
26 parts citric acid
q. s. ammonia

Dissolve the sulphate of iron and pyrophosphate of soda separately, without heat, and mix the solutions. Wash the precipitate and dissolve it in the citrate of ammonia; then evaporate at a low temperature and scale. This is a very elegant preparation. The syrup may be formed by adding three grains of the above salt to each drachm of simple syrup, or it may be flavoured with orange-flower.

ON PYROPHOSPHATE OF IRON.

BY MR. ROBINS.

AMONG all the elementary bodies, not one gives so large a number of beautiful and interesting preparations employed as remedial agents as iron; and were it not that the medical man has already so large a number at his command that he is somewhat perplexed in making a selection, the number might be increased almost *ad infinitum*.

One of the most recently introduced curative agents is (the so-called) pyrophosphate of iron, a salt more beautiful in appearance than the ammonio-citrate, or any other of the scaled salts before introduced. Its colour varies according to the manufacture; may be made from a decided green to a greenish hue, yellow, or more or less of a reddish tint. Water dissolves it readily. In taste it has nothing to indicate its ferruginous character, but is rather that of a pleasant saline, so that the youngest children, or the most fastidious in palate of a larger growth, cannot object to its use. With regard to its efficacy as a tonic, when compared with other preparations of iron, that, of course, can only be decided by medical men.

The name given to the above is decidedly objectionable. The science of chemistry within the last few years has made such rapid progress that there is scarcely a day but some new compound is announced to the scientific world, some of which compounds have such long and formidable names that it requires more courage than many possess to attempt even to pronounce them; others are more simple, yet, from their immense number, but few memories can command them at pleasure. I think it, therefore, a pity when a new preparation is introduced of rather an indefinite composition to increase the necessary difficulties already existing by giving it the name of a definite chemical compound well known. The salt in question physically bears no relation to pyrophosphate of iron, and all that can be said chemically is, that the latter is one of its constituents.

Pyrophosphate, or bibasic phosphate of iron, is obtained by adding a solution

of persulphate or perchloride of iron to a solution of bibasic or pyrophosphate of soda. A white precipitate is thrown down, quite insoluble in water and dilute acids. Pyrophosphate of soda is obtained by simply igniting to redness in a crucible the bibasic or ordinary phosphate of soda. The two are best distinguished by nitrate of silver, which gives with the former a white, and with the latter a yellow, precipitate.

Recently precipitated pyrophosphate of iron, obtained as above, is readily dissolved by pyrophosphate of soda and the alkaline citrates—viz. potash, soda, and ammonia.

When pyrophosphate of soda is used as the solvent, and the solution allowed to evaporate spontaneously in shallow vessels in a warm place, a nice-looking transparent salt is obtained, which, however, is now nearly insoluble in water, evidently from some change that has taken place during desiccation.

Citrates of soda, potash, and ammonia dissolve freely pyrophosphate of iron, yielding salts readily dissolved by water; but the soda citrate I find to give the most satisfactory result. With it an elegant preparation may be made, easily scaled, readily dissolved by water, and which, when exposed to the air, retains its brilliancy for a much longer time than when prepared with citrate of potash or ammonia.

To prepare the citro-pyrophosphate of iron (perhaps the best name we can give it), take citrate of soda in solution, or dissolve citric acid and neutralize it with carbonate of soda, and, with the assistance of heat, dissolve in it as much recently precipitated pyrophosphate of iron as it will take up. Filter and evaporate to the consistence of a syrup. Lastly, spread on glass plates to dry, when beautiful scales of a greenish-yellow colour will be obtained.

One part of dry citrate of soda is required to dissolve the pyrophosphate precipitated from one part of pyrophosphate of soda, free from water of crystallization.

As it may be considered desirable to introduce as much bibasic phosphoric acid into this preparation as possible, the following formula may be preferred :—

Take of Pyrophosphate of soda 1 part
Syrupy citrate of ammonia 1 part
Citrate of soda 2 parts

Dissolve in it as much recently precipitated pyrophosphate of iron as possible, and proceed as before.

The salt formed by this process is also a very elegant one, having a greenish hue, and is perfectly soluble. If a reddish tint be desired, that can be easily attained by the smallest addition of ammonio-citrate of iron, after being reduced to a syrupy consistence.

One of the chief points of success in scaling the above preparations is to take care that the glass plates be not subjected to a heat much above summer temperature.

The President said that these papers were valuable as affording authenticated processes for the preparation of the various syrups of the phosphates which could be used for future reference; and they might be the means of introducing greater uniformity in the strength of these preparations. There was nothing new in the methods employed. It was well known that the moist precipitate of phosphate of iron had been employed, which was dissolved insyrupy phosphoric acid and sugar added.

Mr. Davenport inquired why Mr. Schweitzer had recommended the use of carbonate of soda in effecting the precipitation of the phosphate of iron? He thought it would be likely to yield a mixture of phosphate and carbonate of iron which would not be so well suited for dissolving in the phosphoric acid.

Dr. Redwood said he believed the object of the carbonate of soda was to neutralize the acid set free during the reaction, and so economise the phosphate of soda.

ON *PULU*, AND SOME ANALOGOUS PRODUCTS OF FERNS.

BY M. C. COOKE.

Among the small number of useful products derived from ferns there are four, of closely analogous character, which have been more or less confounded, but which, from recent information, we are able to distinguish with precision, as well as to add some particulars, which, we think, will be of interest to the readers of the *Pharmaceutical Journal*.

All the four products consist of the silky hairs found clothing the rhizome and lower portion of the stalk or *stipes*. Two of them are of interest for their economic applications, and two for their medicinal properties (real or imaginary). The first is produced in the Sandwich Islands, the second in Madeira, and the others in islands of the Indian Archipelago.

I. *PULU*, is, as far as at present known, solely the produce of the Sandwich Islands, from whence the first importation, of which we have any record, reached Liverpool about fifteen years ago, and to which, with subsequent importations, Mr. T. C. Archer called attention in the *Pharmaceutical Journal*, vol. xvi., p. 322.

Three species of *Cibotium*, viz., *C. glaucum*, Hook. et Arnott, *C. Chamissoi*, Kaulf., and *C. Menziesii*, Hooker, are described as natives of the Sandwich Islands. All these were originally described at different times, each by a different author; and Mr. J. Smith is inclined to believe that if a good observer were resident on the spot, and had time and facilities for examining the various phases exhibited by them in the different places of their growth, age, &c., that the whole would resolve into one species. Be that as it may, all produce *Pulu* in more or less quantity, according to place and other circumstances.

From a recent Sandwich Islands newspaper, and other sources, we are enabled to add something to the history of this commercial product. It appears that Pulu has now become an established article of export from that locality. Although its use for pillows, &c., has been known amongst the natives from time immemorial, and a little may have been exported prior to 1851, yet, as an article of trade, it only dates back to that year.

The Custom House returns of the Hawaian Islands give the following amount of export in each year :—

1851	2,479	lbs.
1852	27,088	"
1853	12,739	"
1854	34,031	"
1855	82,558	"
1856	247,740	"
1857	260,560	"
1858	313,220	"

It is exported principally to San Francisco, though not confined wholly to that port, some being sent to Australia, Vancouver's Island, and other places. Messrs. Harris, the principal dealers in *Pulu*, became by accident engaged in the trade. In 1854 they had a suit with a storekeeper in Hawaii, and judgment being rendered in their favour, about 800 lbs. of Pulu was all they could obtain in satisfaction. This material was then worth little or nothing in the market; they, however, took it, and shipped it to San Francisco, where, after some delay, it realized 28 cents per lb. This circumstance decided them in commencing the trade, and now two-thirds of the exports are supplied by them.

The fern which produces the *Pulu* grows on all the high lands, commencing at an elevation of about 1000 feet, and extending upwards to 4000 feet. In size it frequently attains to fifteen feet in height. Though found more or less on the five principal islands, the trade in it is chiefly confined to the districts of Hilo, Hamakua, and Puna in Hawaii. The Pulu is produced around the stalk where the leaf or stem shoots out from the stock of the fern, and only a small quantity is found on each plant, amounting in weight to about two or three ounces. It takes about four years for a plant to produce this amount.

Owing to the large quantities collected of late years, the article is becoming

scarce in the Hilo district, though in the Hamakua and Puna districts large quantities still remain. But as it is farther for the natives to go to obtain it, and as more expense and fatigue is encountered, the cost is gradually advancing, and the probability is that it will continue to advance each year to the extent of a cent per lb. The number of persons engaged in gathering Pulu varies; including men, women, and children, probably from two to three thousand are now dependent on it for a livelihood, receiving generally from five to six cents per lb. on delivery. The labour of gathering Pulu is very tedious and slow. When picked, it is wet, and has to be laid out to dry on the rocks or on mats. In favourable weather it will dry in a day or two, but generally in the Pulu region wet and rainy days prevail, so that frequently the natives do not get their Pulu dry after several weeks, often taking it to market in too wet a state. The dealers have constantly to contend with this inclination of the natives to sell wet Pulu, as it makes considerable difference in the weight when dry. The facilities for drying, packing, and shipping, are improving every year, and the article now shipped is generally dry and in good order, closely packed in wool bales. The trade is reduced to a system, and though there is no probability of any great increase, it will doubtless continue a staple export.

II. This product, of which no local name has come to our knowledge, has long been known and used in Madeira for stuffing cushions, &c. It is the product of *Balantium Culcita*, Kaulf., a fern found in Madeira, Teneriffe, and the Azores, and also in Jamaica and New Granada. The silky hairs of this species bear a great resemblance to those of the various species of *Cibotium*, and the other *Balantium* hereafter named. We are not aware of any exportation of this substance, nor the extent to which it is collected. In the island of Fayal or Villa Orto, one of the Azores, *Dicksonia arborescens*, L'Herit., grows round the margin of a lake in such profusion that the silky down of its stems is used by the principal inhabitants as stuffing for their mattresses.*

III. *Penawar Jambie.*—For information relative to this, and the following notice, we are indebted to Mr. D. Hanbury, who has kindly placed at our disposal some of his correspondence with Dr. J. E. De Vry, of Bandong, Java, and others on this subject. It will be seen that *Penawar Jambie* (this orthography is said to be the best) and *Pakoe Kidang* are not synonyms, though the names are applied to two very similar substances.

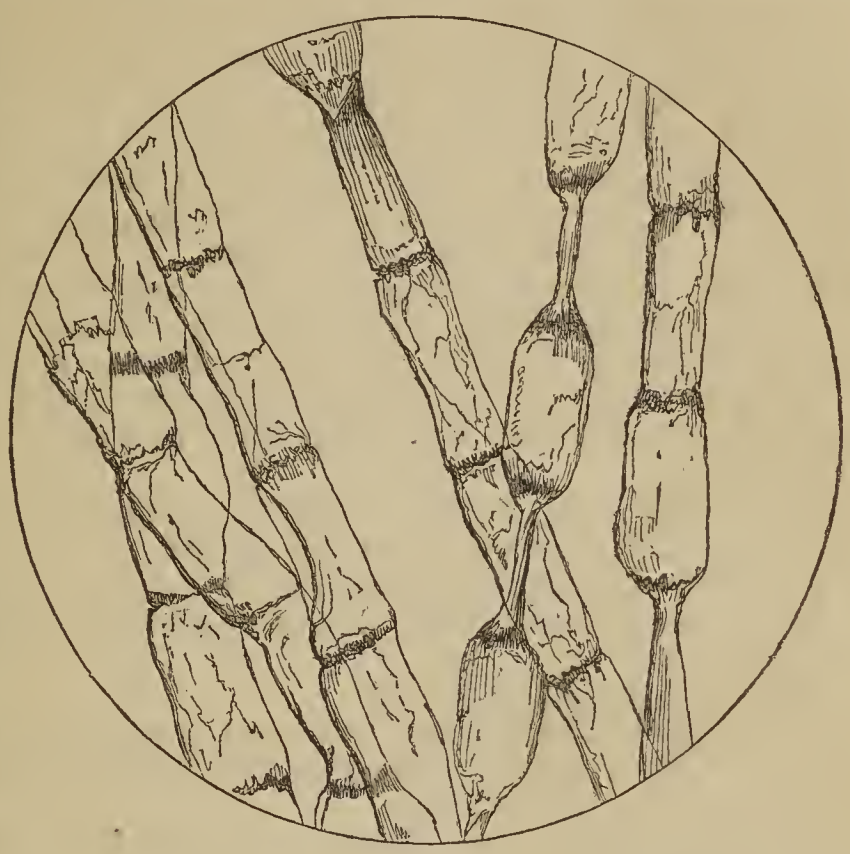
Penawar Jambie is the shining moniliform silky hairs of the rhizome and stipes of *Cibotium Barometz*, J. Smith (*Gen. Fil.*, p. 83), and is produced in Sumatra, and not in Java. It is the *Scythian Lamb* of the old writers. Dr. Oudemans states that this fern, which he speaks of as *C. djambianum*.

Hairs of the rhizome of *Cibotium Barometz* J. Smith, from a specimen cultivated in the Royal Gardens, Kew (magnified about 30 diameters).

* The *Cibotium Schiedei*, Schlecht. et Cham., of Mexico, and *Thyrsopteris elegans*, a native of Juan Fernandes, also produce similar silky hairs.

Hassk., makes a little stem of about one foot in height, and fronds of five feet. The down appears on the young, undeveloped leaves, and as these grow it remains upon the stem between the leaf stalks. Old stems bear a great quantity of this down. The native *doekeons* (female physicians) pick for years at such a stem without exhausting the stock. Sometimes these old stems are on sale at a Spanish matt (four shillings and twopence) a piece.

IV. *PAKOE KIDANG.**—This substance, which is also the shining moniliform hairs of the stipes of a species of fern, or pieces of the hairy stipe itself, is produced by *Balantium chrysotrichum*, Hassk., of which a plantation exists on the sides of the Goenong Gedeh, a volcano in the interior of Java, between 50 and 60 miles from Batavia. The government of the island has exported the produce of this plantation to Holland, where it has been sold at public sale under the name of *Penawar Jambie*. Hasskarl has lived near the Goenong Gedeh, so that there can be no doubt that the product in question is really afforded by the fern he has named. It is stated to grow at a height of from 6000 to 7000 feet above the level of the sea on the Gedeh and Diëng mountains in Java, in the Palembang district, from whence the trade is now supplied in large quantities.



Larger hairs of *Pakoe Kidang* (magnified about 30 diameters).

According to Dr. J. E. De Vry it is this *Pakoe Kidang* that, under the name of Penghawar Djambi, was analyzed by Dr. J. M. Van Bemmelen, in 1856, and it is certainly that noticed by Mr. Hanbury, in the *Pharmaceutical Journal* of November in that year.

Dr. Oudemans mentions, in addition to this fern, as a source of *Pakoe Kidang*, *Alsophila lurida*, Bl., and *Chnoophora tomentosa*, Bl. Mr. J. Smith is inclined to think there may be some mistake as regards these producing hairs like *Cibotium*.

The hairs of the *Pakoe Kidang* (*Balantium chrysotrichum*) are usually thicker, long, and less soft and silky than those of the *Penawar Jambie* (*Cibotium Barometz*). Examined microscopically, the *Pakoe Kidang* presents two kinds of hairs: fine, flocculent, light amber-coloured hairs, flattened, and much twisted, but very translucent; and larger, darker coloured, denser, brittle hairs, with cells seldom exceeding one and a half diameters in length, either twisted, or with the alternate cells collapsed. These are much less translucent than the other variety, and are generally broken. The cells in either variety appear proportionately shorter than those of the *Pulu* of the Sandwich Islands.

Dr. De Vry has found the hairs of the *Pakoe Kidang* to afford upon combustion 6.74 per cent. of ashes, while those of *Penawar Jambie* yielded but 1.53 per cent.

[The hairs of *Balantium Culcita* and those constituting *Pulu* are almost undis-

* See *Pharmaceutical Journal*, vol. xvi., page 278.

tinguishable from the hairs of *Cibotium* represented in the above woodcut.—Ed. *Ph. J.*]

Mr. M. C. Cooke exhibited a series of specimens of Algæ, which were interesting, as illustrative of M. Payen's paper on "Gelose," which appeared in the Journal of last month.

1. *Tan-shwui*, *Lawrencia papillosa*, Grev., so named from the place on the coast of Formosa whence it is procured. From this sea-weed it would appear the Chinese and Japanese manufacture at least one form of the gelatinous substance called *Yang-tsai*, described by M. Payen in the paper above alluded to.

2. *Niu-mau* (ox-hair vegetable), *Gelidium corneum.*—This is made into an iced jelly, and sold in the streets of Ningpo in hot weather. This is the *Algue de Java* from which M. Payen succeeded in obtaining 27 per cent. of Gelose.

3. *Hai-tai* (sea tape), *Laminaria saccharina*, Lamour.—Sent into the interior of China, wherever fossil coal is used. It is considered corrective of the deleterious exhalations of that fuel. It is usually boiled with pork.

4. *Tsz-tsai* (purple vegetable), *Porphyra vulgaris.*—Often eaten as it is to give relish to rice, in various parts of the Chinese empire.

6. *Ki-tsai* (henfoot vegetable), *Gracillaria crassa.*—Cooked with soy or vinegar. Used also by the Chinese ladies to make the hair look glossy, and to strengthen it.

7. Sea-tape from Japan, *Laminaria saccharina*, Lamour.—This is preferred to No. 3, and is considered of better quality.

8. *Yang-tsai*, Chinese moss (*Mousse de Chine*).—Prepared from No. 1.

The above specimens were portions of those sent over by Dr. Macgowan, of Ningpo.

9. *Yang-tsai.*—From Japan.

10. *Yang-tsai*, in a different, and more compact form, from Japan.

11. Specimen of Alga, apparently *Plocaria candida*, received from Malacca, under the name of *Agar-agar.*

12. Carrageen from New Zealand (*Chondrus sp.*)—Analogous to the product of our Irish coasts.

13. Several kinds of Algæ mixed, reputed to be used medicinally in Tunis.

14. *Durvillæa utilis*, from Valparaiso, where it is used as an article of food.

15. Gulf sea-weed (*Sargassum*), also eaten.

ON THE COMPOSITION OF HYDRARGYRUM CUM CRETA.

BY PROFESSOR REDWOOD, PH.D.

In a previous communication I have described the result of the examination of several specimens of "grey powder," undertaken with the view of ascertaining whether arsenic or antimony was present. In no case have I been able to detect either of those substances, but in the course of the investigation another and very important question has arisen, namely, "What is the real nature and composition of grey powder?" It has generally been considered to be a mixture of chalk and finely divided metallic mercury, with a small proportion of black oxide of mercury. Professor Brande, in his *Manual of Pharmacy*, 1833, says:—"By triturating mercury with chalk, a very small portion becomes converted into protoxide—the remainder is very minutely divided, and thus, perhaps, acquires some activity as a mercurial when taken into the stomach."

Pereira, in his *Materia Medica*, 1839, says:—"It consists of mercury and chalk, with perhaps a little protoxide of mercury."

Dr. Nevins, in 1845 (*Pharm. Journ.*, vol. iv., p. 411), published the results of the examination of "grey powder" and "blue pill," and he gives 0.406 grain as the quantity of protoxide of mercury found by him in 100 grains of grey powder.

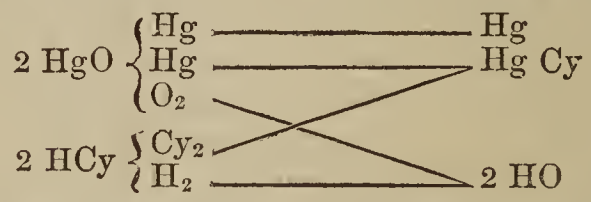
In no case that I am aware of has the quantity of oxide been experimentally estimated at more than a fraction of a grain in 100 grains of the powder, and as it has generally been assumed that the oxide present was the mild black oxide, little importance appeared to be attached to the exact quantity, although the question was frequently discussed, whether the medicinal action of the powder depended upon the small quantity of oxide contained in it, or upon the finely divided metallic mercury?

My attention having, for several years past, been directed to instances in which grey powder which had been made by the application of steam power for effecting the trituration of the ingredients, was found to produce very energetic effects, causing sickness and much irritation of the intestinal canal, I thought it probable that this increased activity and altered character of the medicine was due to the presence of a larger proportion of oxide than would have been produced by the old process of mixing the ingredients with a pestle and mortar; but it has only been in the recent examination of a large number of specimens, for the purpose already alluded to, that I have become aware of the great difference existing in the composition of different specimens. On treating the powder with acetic acid, applying heat, and filtering the liquid, it was found that the solution so formed from some specimens of grey powder yielded, on cooling, an abundant crop of crystals of acetate of mercury. It was this which first attracted my attention in recent experiments, and led to the further examination of those and other specimens. The mercury in the crystallized acetate was in the lower state of oxidation, but by treating with hydrochloric acid some of the same specimens of grey powder which had yielded the acetate, considerable quantities of bichloride of mercury were obtained, thus proving that part of the mercury existed in the state of binoxide. This unexpected result added greatly to the importance of the inquiry, as the quantity of binoxide found in some specimens was sufficient to account for the violent effects sometimes produced by "grey powder." It became evident, as the number of specimens examined was extended, that *hydrargyrum cum creta*, as met with in commerce, has no uniform composition—that it is sometimes a mild and perfectly safe, and at other times a dangerously active, medicine. This difference depends upon the state the mercury contained in it may happen to be in. When prepared by rubbing the ingredients in a mortar by manual labour, the trituration being continued until globules of mercury can no longer be discovered with the naked eye, the quantity of oxide of mercury formed will usually be less than half a grain in one hundred grains of the powder. This was the quantity found by Dr. Nevins, and I have found the same in specimens prepared expressly for this investigation. No doubt the trituration might be kept up until a greater quantity of oxide was formed, but the operator is always too ready to cease rubbing when the required character has been attained by the powder. Human endurance, therefore, in this mode of operating, sets a limit to the extent to which the conditions favourable to oxidation are prolonged. On the other hand, when made by steam power, the ingredients being put into a closed cylinder which is made to revolve upon its axis, the process of agitation may be kept up for a much longer time than is necessary, as I believe is generally the case, for the steam-engine never becomes tired; moreover, the mercury is brought more freely into contact with the air by this process of agitation than it would be by rubbing in a mortar, and the powder cannot be so easily examined from time to time, as it is necessary to open the cylinder in order to do so. The conditions are thus not only more favourable to oxidation in this case than in the other, but the probability is greater that the oxidizing action will be unduly prolonged.

The following table gives results of the analyses of a few of the specimens I have examined, showing the proportions respectively of metallic mercury, protoxide of mercury, and binoxide of mercury, in 100 parts of each specimen:—

	Hg.	HgO.	HgO_2.
1.	37.1	0.4	A trace.
2.	32.5	3.74	1.45
3.	27.9	4.99	5.18
4.	20.4	13.1	4.86
5.	21.7	7.9	8.85
6.	13.1	11.64	14.25

The following method was adopted for determining the two oxides:—The specimens were first treated with warm dilute hydrochloric acid, which dissolved the peroxide, forming corrosive sublimate, and converted the protoxide into calomel, which was left behind with the metallic mercury. The amount of peroxide was ascertained by precipitating the mercury from the solution of bichloride with protochloride of tin. The amount of protoxide was determined by treating a separate portion of the grey powder with hydrocyanic acid. This acid, without attacking the chalk, very readily dissolves the whole of the peroxide and one-half of the protoxide, this latter oxide being converted into bicyanide of mercury and metallic mercury, as shown by the following diagram:



The mercury was precipitated from the bicyanide, as in the previous case, with protochloride of tin, and the amount of precipitate obtained from the bichloride having been deducted from this, the remainder multiplied by two, and calculated into protoxide, gave the amount of the protoxide contained in the specimen. The whole process is very easy, and affords accurate results.

The numbers in the table will serve to show how great a difference may exist in different specimens of *hydrargyrum cum creta*. Specimen No. 1 was made by rubbing the ingredients in a mortar. The mercury here is nearly all in the metallic state, and none, beyond a mere trace, in the state of binoxide. It would be perfectly safe and mild in its operation. On the other hand, the specimen No. 6 could hardly be administered to children without danger. Five grains of this powder would yield nearly one grain of corrosive sublimate, by the action of the hydrochloric acid of the stomach upon the binoxide of mercury. Dr. Pereira gives the following description of the properties of the two oxides of mercury:—

"Pure suboxide (protoxide) of mercury is one of the least irritating of the mercurial preparations, and, therefore, when swallowed does not produce much disorder of the alimentary canal."

"Red oxide (binoxide) of mercury is a powerful irritant, and when taken internally, even in small doses, readily excites vomiting and purging. Large doses excite gastro-enteritis. Orfila found that the red oxide, obtained by precipitation from four grains of corrosive sublimate, killed a dog in eighteen minutes."

There can be little doubt that the violent effects which sometimes follow the administration of grey powder are due to the presence of binoxide of mercury, the quantity of which varies in different specimens from a mere trace up to fourteen or fifteen per cent. of the weight of the powder. This binoxide is not formed in the first instance during the preparation of the medicine, but results from the action of light on the protoxide. Thus in making "grey powder," if the ingredients be subjected to very prolonged trituration, a large quantity of protoxide of mercury will be formed, and the medicine may still be mild in its operation; but on being exposed to light, the comparatively mild protoxide is resolved into metallic mercury and the poisonous peroxide. The facility with which this change takes place is such that it is difficult to prepare a specimen of pure protoxide of mercury, unless light be entirely excluded from it, or some means adopted to counteract the change. Grey powder may therefore be

safe and mild when first prepared, but may become dangerously active by exposure to light. This, however, could only occur when the powder has been subjected to excessive trituration, by which a considerable proportion of the mercury has been converted into protoxide.

The investigation of this subject has suggested the following questions :—

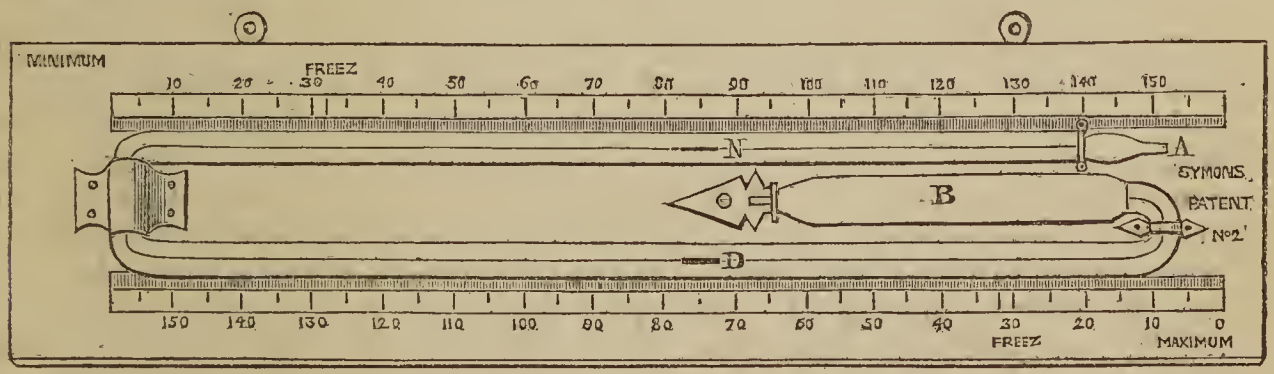
1. Is finely-divided *metallic* mercury mixed with chalk an efficacious medicine, and is it the intention of the College of Physicians that *hydrargyrum cum creta* should consist essentially of those ingredients, and be as free as possible from oxide of mercury?

2. Is the present formula for "grey powder" the best that could be devised? or would it be possible, by altering the formula, to ensure greater uniformity in the preparation?

In reference to the first of these questions I thought it desirable to ascertain the state of the mercury in "blue pill," which is admitted to be an efficacious medicine. In several specimens which have been examined, the mercury was found to be almost wholly in the metallic state, a mere trace only existing as oxide, and these specimens had been prepared by machinery. It would appear, therefore, that finely divided metallic mercury is capable of producing the required effect, and also that the presence of the saccharine matter in "blue pill" prevents the mercury from becoming oxidized as it does in "grey powder." It was probably with the view of effecting this object that manna was directed to be used in making *hydrargyrum cum creta* and *hydrargyrum cum magnesia* in the Dublin Pharmacopœia of 1826. The addition of sugar of milk would perhaps be found to answer the purpose better than manna in some respects. I am not, however, prepared, on the present occasion, to enter fully into the consideration of this part of the subject, but will return to it hereafter.

SYMONS'S PATENT COMBINED MAXIMUM AND MINIMUM MERCURIAL THERMOMETER.

This instrument is somewhat similar to Rutherford's day and night thermometers united into one, and it supplies (perhaps as nearly as it can be practically done) what has so long been considered a great desideratum—viz. a mercurial minimum thermometer, while, as its name implies, it registers the maximum heat as well.



It consists of a glass tube, on a suitable scale, bent as in the figure from A to B; the position and the shape of the bulb may be varied, but the form in the figure is considered the most convenient; from B to D the tube is filled with mercury, and at D the maximum index is placed; from D to N a suitable spirit is introduced, in which at N floats the minimum index; from N to A the tube is filled with air. It will be perceived that the shape of the tube is somewhat similar to a Six's thermometer; but it has many essential differences and advantages. Six's is a spirit thermometer, and in this respect has many disadvantages; it is very liable to get out of order, especially in carriage; it hangs perpendicularly, and has necessarily indices with hair springs, which are very liable to derangement, and require a magnet to adjust them. The thermometer

described above is not liable to these objections; it bears carriage as well as the most ordinary instruments; it is adjusted without magnets, in the simplest manner possible, by merely placing it perpendicular for a second or two. It has received the approbation of several scientific men, and can already be supplied by most of the chief London houses. It is also contemplated to apply the same arrangement to a hygrometer, being, it is believed, the first maximum and minimum hygrometer introduced.

NOTE ON A MANUFACTURED PRODUCT OF SEA-WEED CALLED *JAPANESE ISINGLASS.*

BY DANIEL HANBURY, F.L.S.

The communication to the Académie des Sciences of Paris by M. Payen* of the results of his examination of a gelatinous substance manufactured from sea-weed in China and Japan, induces me to offer a few additional remarks upon the same subject and also to draw the attention of the Society to some specimens of the substance in question. It will be most convenient to commence with the specimens of which I have two.

1. Under the incorrect name of *Japanese Isinglass*, there has been lately imported into London from Japan, a quantity of a substance having the form of compressed, irregularly four-sided sticks, apparently composed of shrivelled, semi-transparent yellowish-white membrane; they are 11 inches long by from 1 to 1½ inches broad, full of cavities, very light (each weighing about three drachms), rather flexible but easily broken, and devoid of taste and smell. Treated with cold water, a stick increases greatly in volume, becoming a quadrangular, spongy bar with somewhat concave sides 1½ inches wide. Though not soluble in cold water to any important extent, the substance dissolves for the most part when boiled for some time, and the solution, even though dilute, gelatinizes upon cooling.

2. The second specimen, also from Japan (which I owe to the kindness of the late John Reeves, Esq.), resembles the preceding in all its properties, but its form is very different, it being in long, shrivelled strips about ⅛ of an inch in diameter. These strips when immersed in water speedily increase in volume, and are then seen to be irregularly rectangular. This substance in colour is usually whiter than the preceding; it is also more readily soluble, cleaner, and altogether a more carefully manufactured article.

The substance under notice in all its forms is used by the Europeans in China as a substitute for true isinglass, for which many of its properties render it highly efficient. That which is perhaps most distinctive, is its power of combining with a very large proportion of water to form a jelly. This property is due to the principle named by M. Payen *Gélose*, of which the Japanese sea-weed product mainly consists. The jelly formed by boiling this sea-weed product or crude gelose in water, and allowing the solution to cool, requires a high temperature for fusion, differing in this respect from a jelly made of isinglass which readily fuses and dissolves in warm water. This character occasions a peculiarity in the taste of culinary jellies made of the new material, inasmuch as they do not dissolve in the mouth as ordinary animal jelly. The jelly of gelose is but little prone to undergo change—so little indeed that sometimes under the name of *sea-weed jelly*, it is imported to this country from Singapore, sweetened, flavoured and ready for use, and in this state it may be kept for years without deterioration.

Gelose differs from animal gelatine in not precipitating tannic acid; from starch jelly in not being rendered blue by iodine; from gum, by its insolubility in cold water and its great gelatinizing power. From the mucilage of *Chondrus crispus*, named by Pereira *carrageenin*, it appears to differ chiefly in its power of

* Sur la Gelose et les Nids de Salangane, *Comptes Rendus*, 17 Oct. 1859.

combining with a great amount of water to form a jelly, which is not the case with carrageenin.

Of the botanical origin of crude gelose or Japanese isinglass and the mode of its preparation in Japan and China we are not yet well informed. M. Payen finds it may be extracted from many species of sea-weed, but especially from *Gelidium corneum* Lamour. and *Gracilaria lichenoides* Grev., the former of which yielded in his experiments to the extent of 27 per cent. *Gelidium corneum* is certainly used by the Chinese as I find by a small collection of economic Chinese *algæ* sent to the Society of Arts in 1857,* the specimens in which Dr. Harvey of Dublin has at my request been kind enough to examine and name. It appears however that several other sea-weeds are likewise employed by the Chinese, some of them on account of their gelatinous qualities; such are *Laurencia papillosa* Grev., *Laminaria saccharina* Lamour., *Porphyra vulgaris* Ag. and a species of *Gracilaria*, apparently *G. crassa* Harv. (Alg. Zeylan. No. 29.) Another sea-weed which is largely collected in the Indian archipelago for exportation to China, and which is one of the species known as *Agar-agar* is *Eucheuma spinosa* Ag.

PHARMACEUTICAL MEETING, EDINBURGH.

A Meeting of the Pharmaceutical Society was held in George Street Hall, on Tuesday evening, 6th March,

MR. RAIMES, PRESIDENT, IN THE CHAIR.

Murray Thomson, M.D. Edin., Resident-Surgeon to the Leith Hospital, read the following paper,

ON THE USE OF HONEY AS A VEHICLE FOR ADMINISTERING REMEDIES EXTERNALLY.

Among the uses to which mankind has put the luscious gatherings of the busy bee medicine has not been forgotten. Indeed, it would have been dishonouring to that insect type of industry if we had not employed the product of its sunshine labour in the noble art of healing. Accordingly from very early times we find that honey has maintained a place in the list of popular medicines. Its slightly laxative action was discovered, and, at the same time, being sweet, it was given to children as an aperient; and its sweetness, of course, was also taken advantage of largely, to cover the taste of other nauseous drugs. Externally too it was erroneously employed as a substance which had the power to ripen an abscess. With this use of honey every one of you must be quite familiar, because in this country, even by intelligent people, a poultice is never applied to a suppuration without previously being spread with honey, or a mixture of honey and fresh butter, under the belief that it has the power of draining the matter out of the body. But this popular belief in honey ceased in due time to be merely popular, and rose so high in general esteem as at length to become, in common parlance, recommended by the faculty, and its adoption by that learned body was very general. It occupies a place in all the three Pharmacopœias of the United Kingdom, and in the Codex, the authoritative list of medicines in France as well as in that of other foreign countries; and my object in this short paper is to show a few reasons why it should still retain a place in our list of Materia Medica.

In the three Pharmacopœias of Great Britain and Ireland, now happily merging into one, there are in all three officinal preparations in which honey is used as a medium of admixture and administration. These preparations are the mel. boracis of the Edinburgh, London, and Dublin Pharmacopœias, the mel. rosæ of Edinburgh and London, and the oxymel scillæ of London and Dublin. The mel. boracis is still, I understand, to be retained in the new British Pharmacopœia, now under preparation, but the mel. rosæ is to be expunged, and probably also the oxymel scillæ. No one will, I think, regret the loss of these two preparations, because, as they were only used for internal administration, the corresponding syrups of roses and squills will supply their place as well, if not better. Fortunately, for my purpose,

* *Journ. of the Society of Arts*, 30th Oct., 1857, and 24th Feb., 1860.

however, the mel. boracis is to be, as I have said, retained, for it is the representative of the class of preparations which I have now the honour to bring under the notice of this Society.

In doing so I do not claim any great credit for originality in recommending honey as a vehicle for administering remedies externally, inasmuch as the fact of the existence of the mel. boracis in our Pharmacopœias already forbids such a claim. But still more fatal to such a claim is a sentence in Pereira's great work on Materia Medica, under the article mel., wherein it is stated that honey may be used to administer various remedies externally. However, my notion of employing honey in this way was not derived from Pereira, inasmuch as I had made, and pretty extensively used, three of the preparations now before me more than a month previous to my reading the above sentence. When I did begin to use these preparations, it occurred to me as somewhat strange that honey had not been more employed than it has been for the same purposes for which the honey in the mel. boracis is used, and that, indeed, there was not a series of honeys corresponding to the borax one. All, therefore, that I take credit for, is simply the suggestion of such a series of compounds, and the putting of that suggestion into a practical shape, so as to establish the practice of using honey as a medicinal vehicle, and showing that it is even more valuable than other substances used for the same purpose.

The class of pharmacopœial preparations for which I would more particularly substitute these medicated honeys is the ointments. And here I would remark that though the word ointment, or its more Latinised synonyme unguent, usually suggests a substance of a greasy nature, and that, in fact, it is some drug distributed through a quantity of lard; it does not follow from this that an ointment may not exist which has not a particle of fat in it, because the Latin verb unguo, which gives origin to the word ointment, simply means to anoint, and that, I presume, may be as effectually done by a thickened electuary, like the mel. boracis, as by any ointment in the Pharmacopœia. I have no hesitation, therefore, in saying that these preparations now before me are "honey ointments."

But in recommending one kind of ointment to be substituted for another, I must not forget that ointments, as a whole, are losing rather than gaining ground in the estimation of medical men. They, now-a-days, rather apply a lotion to an external disease than an ointment. And, indeed, in almost all wounds and sores even a medicated lotion is largely abandoned, and simple cold water dressing is now the only treatment employed. With this now generally adopted practice I have no wish to meddle, because the improvement such treatment effects in the comfort and cleanliness of the patient is very considerable indeed. Still, this recent practice, for reasons which we will immediately see, does not combat the idea of introducing "honey ointments."

The extensive use which the older surgeons and physicians made of ointments seemed to depend on a notion they entertained that their healing action was entirely local, and limited to the part to which it was applied. We now know, however, by a more enlightened pathology, that any such local action is small compared with the effect they have on the whole system, especially on the blood-vessels, which they seem to stimulate to a more healthy discharge of their functions. This healing action can be induced by cauterants and lotions, as well as by ointments; and the former, as I have already said, are more used at present than the latter, still if the ointment was rendered less objectionable, there is no reason why it should not retain its place in the Pharmacopœia, and in the estimation of medical men.

It appears to me that one of the most important objections to our present ointments is their fatty nature, which renders the active substances contained in them difficult of absorption into the body. The human skin when unbroken is not an actively absorbent surface, and even when a wound exists in it, absorption is still a tardy process. But what absorbing power there is is certainly facilitated when the substance to be taken up is soluble in water. Now the fatty matter of ointments is not so soluble, and, therefore, some chemical change must needs take place, such as that of saponification, before absorption can go on readily. It is stated, however, on highest authority, such as Prof. Simpson, who in a paper on the treatment of scrofula by oil inunction, says that oil passes rapidly through the human skin. But however readily that may be done, some such change as that I have already alluded to must previously take place; and we may get rid of this difficulty at once, if we were to make our ointments with honey instead of lard, for we would have then a substance

as a vehicle at once soluble in the juices of the body without undergoing any alteration in a chemical sense; so that the absorption of such a body must go on much more speedily than another which requires to be chemically altered previous to its being taken up. I lay considerable stress on this advantage which honey has over lard in recommending it for the preparation of unguents. That advantage, too, is of great service in the actual use of these preparations. Perfect cleanliness is very essential to the healing of a wound or other broken surface, but such cleanliness is not easily attained when using a fatty ointment, because that on each fresh application of the remedy the remnants of the former one are difficult and painful to remove, simply from their greasy nature. But that objection does not hold with honey, as that substance washes off either in cold or warm water most readily.

The next great advantage which honey has over lard is the pleasantness of its flavour and taste. To the great majority of people these are unexceptionable, but, at the same time, there are a few persons who have an idiosyneratie dislike to honey in any shape whatever. But even to those the smallness of the quantity of these honey unguents which would be applied to an affection of the organs of taste and smell would, to a large extent, disarm their objections. This advantage of honey in flavour and taste enables us to employ ointments made of it to places where a lardaceous one would be quite inadmissible, such as to the mouth and throat. Indeed, the chief use which has hitherto been made of the mel. boracis is as an application to the aphthous diseases of the mouth and throat of children; and, as an extension of that practice, I have used a mel. aluminis, a mixture of dry alum and honey, with marked success, to various affections of the throat and tonsils of both young and old people. The strength of this mel. aluminis is ʒii. alum to ℥iii. of honey. The kind of case which has succeeded best with it has been cynanche tonsillaris, or common sore-throat, the honey ointment being, of course, applied only after the acute symptoms have subsided, just at the time when hitherto a detergent and astringent gargle has been invariably prescribed.

The other kinds of honey ointments which I have used more or less have been a mel. zinci and a mel. plumbi acetatis. Both of these I have used with good success in eczematous skin affections. These latter have been prepared in the same way, and in the same proportion as the ordinary pharmacopœial ointments of the same name, only substituting honey for lard. These three are the only honey unguents I have yet had opportunities of actually trying on cases which have come under my care. But doubtless many others might be made and tried; one made of bismuth and opium, for instance, I have had made with the view of trying it as a palliative on painful hæmorrhoids. I say only as a palliative, because, of course, no ointment whatever can fairly cure that troublesome affection.

The advantages then in a medical point of view which these honey ointments possess are chiefly two; 1st, their solubility in water and consequent easy absorption; and 2nd, their desirableness in point of flavour and taste. I might here add a 3rd, namely, the comparative freedom from adulteration which honey has over lard, but on this I will say a few words immediately. But in the mean time, let me remark in reference to the first advantage that, though these unguents may be soluble in water and easily absorbed, it does not follow that an insoluble substance mixed with them, such as oxide of zinc, trisnitrate of bismuth, is thereby rendered easily absorbed also; but in this the honey is at no greater disadvantage than the lard, which must also leave untouched such insoluble powders mixed with it.

In looking at these ointments from a pharmaceutical point of view, I would first notice that there is nothing extravagant in point of cost in proposing to substitute honey for lard, because the two substances are as nearly as possible equal in market value; but in addressing you on a point like this, "I speak as unto wise men, therefore, judge ye what I say," when I mention that, on good authority, honey and lard of average quality can be had for about 8*d.* a pound.

There is a decided advantage, as I have already said, in using honey in place of lard, on account of the freedom from adulteration possessed by the former more than the latter. A pharmacien is, therefore, much more sure of what he is dealing with in the one case than in the other; an assurance which I think must give the greatest comfort to every one who cares to work with pure materials, and who is it that does not? The only adulteration which is known to be practised with honey is to add to it farinaceous matters, which, however, are easy of detection, the London Pharmacopœia giving a formula for that purpose. Dr. A. H. Hassall, the sanitary

commissioner of the *Lancet*, never in the course of his whole inquiry mentions honey as an adulterated article, though he examined all the substances related to it, as sugar, milk, &c.; but the case is different with lard, inasmuch as he mentions having found mixed in it the following: water, starch, potass, alum, lime, carbonate of potass and soda, and salt.

These results on the adulteration of this substance are confirmed by a writer in the Journal of this Society. The article occurs in the January number for 1853, and is written by Mr. G. Whipple. If, therefore, it is of importance in the preparation of trustworthy medicines to begin with pure materials, there can be, I think, but one opinion as to the choice between honey and lard.

Another advantage which these honey ointments have over lardaceous ones is the cleanliness with which they can be made, and the ease with which utensils used in their preparation can afterwards be cleaned. To the younger members of your profession this is a positive improvement of no mean moment, because, as the duty devolves on them of cleaning up, then should the day ever come when honey will supplant lard in the preparation of ointments, there will be an end to the grievance which consists in the purifying of greasy mortars and slabs.

I have now only a few words to say on the preparation of these unguents. As a general rule they are prepared in the same way as ordinary ointments, the medicinal substance being simply mixed with the honey in a mortar, or on a flat slab, whichever may be found most convenient. In preparing those samples which I used in my own practice, I used a warm mortar to make the mixture in; by this means the honey is liquefied somewhat, and thus the operation of mixing is facilitated. (And I may here also remark that when using these honey compounds medically, it is advantageous to thin them a little by heat, more especially if it is wished to apply them by a camel hair pencil, which in these circumstances answers very well.) The four samples which I now show you were made for me by my friend Mr. Finlayson, of Leith, and were made in precisely the same way I have already mentioned.

There are one or two substances much used in medicine as external remedies which must not be mixed with honey, because, as it is nothing else, chemically speaking, than grape sugar, it would react on and decompose some of the substances I allude to, an example of which we have in sulphate of copper, which, when mixed with honey, begins slowly to decompose, and a red suboxide of copper is thereby formed, which is quite inert for any medicinal purpose. The same phenomena would ensue if we mixed honey with a silver salt, such as lunar caustic; black oxide of silver would then be produced, which would finally be reduced to metallic silver itself. It is well, therefore, that these cautions should be kept in mind.

There is also another general rule which applies to the preparation of these honey ointments, and, indeed, to all ointments, which is, that all salts which contain water of crystallization, and of which it is wished to make an ointment, should have that water carefully driven off by heat, otherwise it will forbid the formation of a perfect ointment in the case of lard, and in the case of honey would dilute the compound needlessly. When I have mentioned proportions in what has gone before, I mean them as applying to the dry salts.

In concluding this short paper, let me express a hope that, although these honey compounds may never have the good fortune to become officinal in the new British Pharmacopœia, yet if they are found to be an improvement, however small, in the administration of medicines externally, then surely it is a step gained, and, at all events, they will enable a medical man to render his treatment a little more agreeable if not a little more successful.

A vote of thanks was passed unanimously to Dr. Thomson for his communication.

Mr. W. D. Hart then introduced an Improved Induction Coil, which, having explained to the meeting, he used for the purpose of performing a series of very beautiful and interesting experiments. He showed the effect of the electric current when passed through an atmosphere of carbonic acid, hydrogen, and oxygen gases, in various shaped tubes and cylinders, some of a colossal size,—all of which were highly successful, He concluded amidst much applause, and received the thanks of the Society.

The meeting thereafter adjourned.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

A CONVERSAZIONE of the Chemists' Association was held in the Royal Institution, Colquitt Street, on Feb. 21st. This building is admirably adapted for meetings of a scientific character, and is used by several of the learned societies in Liverpool, being convenient and central, and containing a large and valuable collection of objects of natural history, geology, &c., which are easily available for illustrating the lectures and papers. The suite of rooms is extensive, and includes a large and small lecture room, in addition to which, detached from the main building, is a gallery of art, containing a valuable collection of paintings, and a museum of applied science recently formed and progressing very favourably.

When the Institution was first formed, the various rooms forming the museum could only be visited during the day, and could not be made use of for any evening entertainment, excepting arrangements were made for lighting them temporarily, which has often been done. This, however, being attended with inconvenience, as well as great expense, and a strong desire having recently sprung up among the members of two or three societies, but especially that of the Chemists' Association, to have *re-unions* of a social and scientific character occasionally, the Council of the Chemists' Association, at the suggestion of one of their honorary members, and with the special approbation of the committee of the Royal Institution, determined during last summer to have all the rooms permanently lighted with gas. The Literary and Philosophical Society having acquiesced in a similar proposal, the object has been carried into effect by these two societies.

The Council appointed the above evening for the first Conversazione of the session. The arrangements having been completed, the company, including ladies principally in evening costume, began to assemble at half-past six o'clock, and continued to arrive until past eight, at which time between 350 and 400 were present. The whole of the rooms, including the Gallery of Art and Museum of Applied Science, were thrown open, and those ladies and gentlemen who arrived early spent a short time in viewing the contents of the Museum, and at seven o'clock the company assembled in the large Lecture Room, when the chair was taken by J. BAKER EDWARDS, Esq., President of the Association.

In opening the proceedings, the President expressed the pleasure it afforded him to see so large an attendance on the occasion, and congratulated the Members on the estimation in which the Association is held, as was evidenced by the very numerous attendance of scientific gentlemen and strangers, including a large proportion of ladies.

The PRESIDENT then introduced Mr. WOOD, of the firm of Abraham and Co., Lord Street, who by means of the oxy-hydrogen light and excellent lenses, projected some very beautiful photographic scenery, embracing views of celebrated buildings, scenery, statuary, &c. The pictures were exceedingly well represented, particularly the statuary, which was brought out in such high relief and sharp and well-defined outline, that it was difficult to imagine that it was merely the reflexion of a very small picture highly magnified.

Professor ARCHER exhibited a very elegant and ingenious instrument, called the pneumatic ventilator, governor, and fire-indicator, invented by Messrs. Taylor and Grimshaw. The instrument is, in point of fact, an air thermometer, acting by the expansion or contraction of air contained in a chamber of the cylinder, which constitutes the chief portion of the apparatus. This produces on expanding a sufficient power on a piston-rod either to ring a small alarum-bell for household purposes, to fire a cannon, or to ring a large bell for giving alarm when fire breaks out in ships or extensive buildings. One great advantage offered by the apparatus is the facility with which it can be adapted to a variety of purposes. For instance, it can be made to tell when heating has commenced in the hold of a laden ship or in a haystack, thereby giving notice sufficient to avert entire destruction. Again, it can be so used that a fire breaking out in the lower part of a house causes it to ring a bell in any or every room, so that time for escape is given. It will also announce by its warning bell, in chemical and other laboratories requiring nice adjustment of temperature, any change that may take place, and by a simple adaptation it can be

made to govern the regulations of a room or building, so that a perfectly equal temperature can be kept up. The apparatus was much admired, both for its extreme simplicity and the apparent difficulty of deranging it.

The PRESIDENT then announced that one hour wonld be devoted to promenade and refreshment, and also stated that several contributions sent in by various gentlemen would be found distributed in the rooms, and were worthy of especial attention: these included several valuable microscopes with interesting objects under view, belonging to the Members of the Microscopical Society, as well as to Members of the Association. In the Bird Room was arranged a splendid collection of Bronzes and other illustrations of Electro-typic Art from the establishment of Messrs. Elkington and Company, of Liverpool and Birmingham, amongst which were the following:—Marochetti's bust of Sir Robert Peel; a bronze bust of Camilla, from the British Museum; busts of Wellington and Mendelssohn; a large wine cooler, in gilt and oxide, designed from a marble basin in the Villa Albana, at Rome; a large jug by Jeannest; a copy of Cellini's cup and a Roman candlestick; a beautiful dish, in gilt and oxide, designed by Grant, with scenes from the Iliad; a tankard from the celebrated carving in ivory in the possession of Mr. Bedford; the Amazon tazza, copied from the original in the possession of the King of Prussia; a variety of beautiful statuettes; the Centaur cup, from the original in the Museum at Naples; two Saracenic bowls, from the Marlborough House collection; and many other articles of great beauty.

Mr. CHADBURN and several Members of the Association exhibited some excellent stereoscopes, and a well-selected assortment of views. A portfolio of large photographs, highly finished, representing Alpine scenery, architectural and marine views, was shown by Mr. Cros. A case containing a very beautiful assortment of aluminium jewellery, was shown by Mr. Promoli; and a specimen of aluminium leaf was also among the novelties. Gyroscopes, Gorham's Colour Tops, and some other instruments, were exhibited.

On the table in the large Lecture Room was placed one of Duncan's Patent Water Meters in action. This machine is constructed on the principle of the locomotive steam-engine, having two cylinders, so that, when water under pressure is admitted, the pistons are forced forward and backward alternately; connected with the pistons is an axle and crank, by means of which the number of strokes of the piston is indicated, and these, by an ingenious arrangement, are recorded on an index attached to the axle—so that, the quantity of water discharged by each stroke of the piston being known, the number of revolutions of the axle indicates the quantity of water having passed through the machine. Several large establishments in Liverpool are now supplied with water by meter.

At nine o'clock the chair was resumed, when EDWARD B. BRIGHT, Esq., of the Magnetic Telegraph Company, delivered an address on Recent Applications of Electricity to Mechanical and other Practical Purposes, including electro-motive power, the magnetic telegraph, electro-plating weaving in patterns; the advantages of magnetism as a source of electric light, the regulation of clocks by electricity, the Atlantic cable, &c. &c. Mr. Bright stated that the substitute of electrical power in place of the cards used in the Jacquard loom, was quite a new application of electro-motive power, discovered by the Director-General of Sardinian Telegraph, and only introduced into this country about six weeks ago. It is anticipated that it will effect an extraordinary saving in the production of elaborate patterns in silk and other costly fabric weaving. Several pieces of silk fabric woven by the new machine were shown to the audience.

The PRESIDENT then exhibited, by means of a powerful Ruhmkorff's battery, a number of new and very beautiful experiments representing the passage of the electric fluid through tubes charged with various gases, and others illustrative of the aurora and zodiacal light.

Mr. ABRAHAM, in moving a vote of thanks to the gentlemen who had given their honorary services during the evening, referred particularly to their Secretary, Mr. Shaw, and to Messrs. Wood, Bright, and the President. The two latter had given them the results of much labour and curious research, and he was sure that the audience had highly appreciated the services of all these gentlemen. The motion having been seconded by Prof. ELLIOT, and carried with acclamation, the proceedings terminated about 11 o'clock.

Royal Institution.

The Eleventh Meeting of the Session was held on March 1st,

THE PRESIDENT IN THE CHAIR.

Messrs. R. Neilson, J. Hickie, R. Bramwell, J. W. Jackson, and T. Fergie, were elected Members. The following donations were announced by the Secretary:—*Transactions of the Historic Society for* 1859, from the Society; Carbonate of Lithia, from Dr. Edwards.

Dr. COLLINGWOOD delivered a second lecture "On Invertebrate Zoology. Part II. Theoretical Deductions: the common Molluscan Plan and its Modification."

The lecture, as on a former occasion, was illustrated by a large collection of drawings, and figures of several molluscs.

A vote of thanks to the lecturer terminated the proceedings.

Royal Institution.

The Twelfth Meeting of the Session was held on March 15th,

THE PRESIDENT IN THE CHAIR.

The Secretary announced the following donations:—Two parts of Muspratt's *Chemistry*, from Mr. Wright; a large specimen of Bleached Shellac, from Mr. Mercer; and some Spun Shellac, from Messrs. Higgins and Cattle.

The CHAIRMAN said that at the last meeting he had exhibited the carbonate of the metal lithium, and he now presented a specimen of the metal itself, which is so light as to float upon the surface of the hydro-carbon in which it is preserved. He exhibited a piece of the metal in the form of wire, which was not half the density of water; and specimens of other metals, calcium, sodium, &c.—Mr. N. MERCER then delivered a lecture on the manufacture of hydro-carbon oils, from coal and other bituminous substances. After noticing the chemical composition of coal, he explained the difference between it and bitumens, both liquid and solid. The methods employed in the production of paraffine oils, photogen, belmontine, &c., were discussed, and illustrated with various diagrams and specimens. The composition of coal tar was also noticed, with the many useful productions obtained from it; and this portion of the lecture was illustrated by several beautiful specimens of purple and crimson silk, dyed by means of the salts of aniline. Benzole, both in liquid and solid state, was exhibited. The lecture throughout proved highly interesting to the audience, as was evidenced by the applause which greeted the lecturer on his resuming his seat.—The PRESIDENT observed, that in the pleasing duty which devolved upon him of proposing a vote of thanks to Mr. Mercer, he had been entirely superseded by the unanimous and spontaneous voice of the meeting.

ORIGINAL AND EXTRACTED ARTICLES.

CULTIVATION OF MEDICINAL PLANTS AT HITCHIN, HERTS.

(*Concluded from p.* 416.)

BY PROFESSOR BENTLEY, M.R.C.S., F.L.S.

4. BELLADONNA.

BELLADONNA or Deadly Nightshade (*Atropa Belladonna*, Linn.) has been cultivated at Hitchin, more or less, for more than 30 years. It is now grown there by Messrs. Ransom and Perks, and on an average of some years, about four acres of land are reserved for its culture.

The London Pharmacopœia states "that the herb which grows spontaneously in hedges, and in uncultivated places, is to be preferred to that cultivated in gardens." This is, moreover, the more common opinion respecting its activity, but we believe with Dr. Christison, that there is no good evidence of the medicinal activity of the plant being diminished by cultivation. We expressed a like opinion upon the comparative activity of wild and cultivated henbane, when treating upon that plant in the present volume of the *Pharmaceutical Journal*, at page 414, and the same observations which we there made upon it, will also apply to belladonna, namely—that it is an important circumstance, that there is probably but little difference in the medicinal activity of the wild and

cultivated plants; for belladonna is employed at the present time far too extensively for our supplies to be derived entirely from wild plants, as it is now by no means abundant in this country, and is, moreover, becoming less so every year, such a source of supply would soon become exhausted. In fact, at the present day, we know that nearly all the preparations of belladonna, in this country at least, are made from the cultivated plants. Some further experiments upon the comparative medicinal activity of wild henbane and wild belladonna and those of cultivated plants, are however desirable, before we can arrive at any absolutely positive conclusions respecting them.

In a wild state, belladonna is found growing in moist situations, and commonly in a loamy soil, in waste places, and near ruins. At Hitchin, we find that both the cultivators of belladonna grow it as far as is possible, in a similar soil to that in which it thus occurs wild.

Belladonna is propagated in two ways at Hitchin; that is, by division of its roots, and from seed. When it is grown by division of the roots (which mode is adopted by Mr. Perks), the plants are taken up when about three or four years old, at which period they are in the most perfectly mature state; the roots are then divided, and the cuttings afterwards planted out in autumn, in rows about a yard apart, and at a distance of about one foot between each plant, in a damp stiff loamy soil. After the operation of planting has been performed, a good top dressing of farm-yard manure is applied. This manure is given for the purpose of affording a free supply of nourishment to the young plants, and also, to preserve their young shoots from injury by the late frosts in the spring, when, as sometimes happens, after a mild winter, they appear above ground at an early period.

When belladonna is raised from seed (which mode is adopted by Mr. Ransom), it is the usual practice to sow about March, in a moist loamy soil, as already noticed with the roots. The seedlings begin to make their appearance in May; they grow very slowly for the next two months, but towards the autumn, they progress more rapidly. These plants usually flower but little, or not at all, during their first year's growth, and do not appear to possess so great an activity as those of the second and following year's growth, in which respect they resemble the *Biennial black henbane*. The comparative medicinal activity of the first and second year's growth of belladonna is well worthy of some experiments. We think it most probable, that the plants of the second year are in the most active condition; and if such should ultimately prove to be the case, it would be found very desirable to prevent any flowering of the plants during the first year should they exhibit a disposition to do so, as by such a course of proceeding no such exhaustion would take place as is always observed after that process, and in proportion to its extent; and hence they would have time to mature themselves, and to store up for the next year, those substances upon the presence of which their medicinal activity is due.

The first frosts in the autumn cause the plants to die down to the ground; and then before the winter approaches, while the weather is still open, these young first year's plants are planted about two feet apart in rows, which are also placed about the same distance from each other. The ground is then well manured with stable manure. During the winter, there is no trace of the plants above ground. On their first appearance in the spring, the ground around them is well hoed, and a like operation is repeated every few weeks during the summer months.

When the plants have arrived at their maturity in June, if the weather should be very hot and dry, they are liable to be attacked by a kind of blight, in which case, although previously healthy and vigorous, they begin to droop, the leaves alter in colour, and soon become completely withered. In this way, in dry hot seasons, much injury is done to the belladonna crop.

About the end of June, or in the month of July, according to the season, the belladonna is considered to be in perfection. Mr. Ransom regards it as in the

most active medicinal state when most of the flowers are over, and the seeds thoroughly developed. He also believes that the plants are best adapted for making extract when they do not grow too luxuriantly.

When the belladonna is in full flower, as mentioned above, the preparation of extract commences. For that purpose, the herb is generally cut with a hook, and then brought from the field to the laboratory in a perfectly fresh state, every two or three hours. It is then carefully picked over, and all the decayed leaves removed, and the remainder used for the extract. The whole time, according to Mr. Ransom, from the herb growing in the field to its conversion into extract fit for use, only occupies from twelve to sixteen hours. By thus making up the belladonna as quickly as possible into extract, all danger of its heating is prevented; if, on the contrary, it is packed up into heaps in the laboratory, even for a short time, when the weather is hot and damp, it is much injured, and the quality of the extract deteriorated in consequence. While the extract is being prepared, the men engaged in the laboratory have their eyes, &c., much affected, so that great care is required to be exercised in stirring it as it is being prepared, and in regulating the temperature, which is always kept as low as possible.

The yield of belladonna per acre varies very much, as we have already seen is the case with henbane, according as the season is favourable or otherwise; for while in some years it is more than five tons per acre, at other times it does not exceed one ton. The amount of extract obtainable from a given quantity of belladonna, is also liable to much variation. From four to five pounds of extract per cwt. is the average yield, but, in some cases, as much as six and a half pounds per cwt. have been obtained.

Two crops of belladonna are sometimes obtained in one year; the first in June, and the second in September; but we regard this as a very objectionable practice, as the extract obtained from the autumn plant is very inferior, both in appearance and in activity, to that prepared in the summer months at the time previously mentioned. When a second crop is thus desired, it is considered advantageous to give the plants after the collection of the first crop a top dressing of stable manure. This is found to be very efficacious to the plants, and more especially so, should the weather be afterwards showery.

Belladonna plants rarely live beyond a period of from three to five years; and as the older plants die out, fresh seedlings are put in to supply their place.

5. ACONITE OR MONKSHOOD.

The only cultivator of monkshood or aconite, at Hitchin, is Mr. Ransom. At the time we were at Hitchin to visit his ground, namely, in September, the plants were out of flower, and we had therefore no opportunity of examining the particular species of *Aconitum* cultivated by him, but he informs us, that he only grows the officinal species of the British Pharmacopœias, namely, the *Aconitum Napellus*.

Aconite is propagated by dividing the roots of the mature plants; but, in order to explain this operation in a satisfactory way, it will be necessary for us to refer briefly to the mode in which the roots of *Aconitum Napellus* and other species of *Aconitum* are developed. It is as follows:—Each root develops at its upper end at the side,—that is, at the point where it is connected with the stem, during the spring, summer, and autumn—one or more young roots or tubercules; these are nourished by the old root at first, which gradually decays as they progress in growth, and ultimately perishes. The young roots thus produced on the side of the parent, form in like manner, during the succeeding year, one or more roots from their sides, and after affording nourishment to them, perish like the former, and a similar formation of roots, with decay of the parent, takes place every year. Hence, if the root of *Aconitum Napellus*, or other species, be taken up early in the spring, it is seen to consist of but one axis, but when dug up in the autumn, it is surrounded by one or more offsets, and hence also, each

root of an aconite is biennial, but as it has the power of forming new ones every year, the duration of the whole plant is perennial.

The plan adopted for propagating aconite is founded upon this mode of development of its roots. Thus, when it is desired to increase the breadth of land under cultivation for monkshood, the old beds in which it has been grown are dug up, the finest roots are taken out, and reserved for future use, and the smaller ones are then planted out in rows about nine inches or a foot apart, and a like distance is maintained between the rows. The ground before planting is well pulverized, and afterwards mixed with a moderate quantity of good stable manure. This operation of digging up the roots for use, and for the purpose of replanting, is commonly performed in December and January, at which periods they appear to possess the greatest amount of medicinal activity, and are best adapted for transplanting. It is in all cases considered desirable to transplant thus early in the year, as aconite is one of the earliest spring plants to make its appearance above ground. In late seasons, however, the collection and transplanting of roots may be postponed with advantage till February. Perhaps it would be more desirable to perform the above operations of digging up the roots for use, and for transplanting, late in the autumn.

The roots of aconite which are not replanted, are dried by steam heat, and reserved for making an alcoholic extract of aconite, and for sale for the preparation of the tincture. This alcoholic extract of aconite is not, however, that of Pharmacopœias, for that is ordered to be made from the fresh leaves. This Pharmacopœia extract is made from the leaves by Mr. Ransom, about the first week in July. This extract is made as quickly as possible after the leaves have been brought in from the fields, in the same way as we have mentioned such to be the case in the preparations of the extracts of henbane and belladonna.

The leaves from some of the plants are collected in the field, and dried as soon as possible afterwards by steam heat, and then sold as *folia aconiti.*

It is necessary to exercise much care in making the preparations, &c., of aconite, as the men engaged in such operations are often much affected in the throat, nose, &c., by the fumes, also by the juice in bruising the roots, and by the powder during their pulverization.

We have now treated of all the medicinal plants that are commonly cultivated to any extent at Hitchin, namely, *lavender, elaterium, henbane, belladonna,* and *aconite* or *monkshood;* but, besides these, several others are also grown there. Thus savine (*Juniperus sabina*) is propagated from slips, which are planted in the autumn. This plant is there used for the purpose of distilling the oil, and for making extract and ointment. The opium or garden poppy (*Papaver somniferum*) is also frequently cultivated at Hitchin, for the sake of its capsules or heads; but the large quantities of these which are now imported in a crushed condition, &c., has been found to interfere materially with its profitable cultivation, and hence this crop is not a general one at Hitchin. The other plants which have been, or are now grown at Hitchin, are *peppermint, lettuce, liquorice, caraway, colchicum, stramonium,* &c. These are not, however, cultivated to any extent worth notice, so that we are unable to gather any satisfactory information as to their modes of propagation and collection from their culture at Hitchin.*

REPORT OF THE
RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,
AND OF THE
APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Composition of Vegetable Gums.—M. E. Fremy has communicated to the French Academy the results of a very interesting and important investigation

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* We shall be much obliged to any correspondents who will give us any information respecting the cultivation of chicory, colchicum, liquorice, caraway, rhubarb, lettuce, &c., in any part of the country. Any details as to the quantities of medicinal plants cultivated in particular localities, will also be acceptable.—R. B.

into the constitution of the gums, and the mode of their production in the vegetable organism, which opens up an entirely new view of the subject. He had been led, by his valuable researches on the gelatinous bodies, and their isomeric transformations, which are found present in the utricular tissues of plants, to consider that the gums might be arranged into a series of bodies comparable to those derived from pectose; he therefore undertook their investigation.

M. Fremy found that concentrated sulphuric acid was capable of effecting a complete modification of gum arabic, and of converting it into a new body perfectly insoluble in water. The experiment is conducted in the following manner:—A mucilage of gum arabic is first prepared, so thick that it will scarcely run from the vessel containing it; this is then poured into a glass containing concentrated sulphuric acid. The mucilage floats on the surface of the acid without any admixture taking place; the contact is allowed to continue for several hours, and ultimately the gum is found to be transformed into a kind of membrane, which is insoluble in boiling water. This substance, when properly washed, does not retain a trace of sulphuric acid. For reasons which will be more obvious presently, M. Fremy names this body *Metagummic acid.* This acid resists for many hours the action of boiling water, even under pressure; but if heated with small quantities of any base, such as the alkalies or alkaline earths, it immediately dissolves and undergoes another modification; for acids do not precipitate it from the solution. The new body, therefore, now in combination with the base, is termed *Gummic Acid.* M. Fremy states that he has studied this action of bases on metagummic acid with the greatest care, and he finds the resulting compound to present all the characters of gum arabic. These experiments tend then to cause us to entirely alter our ideas of the nature of the gums. Instead of regarding gum as a neutral body, somewhat analogous to dextrine, it must be considered as derived from a principle, metagummic acid, insoluble in water, which under the influence of bases becomes soluble, is converted into gummic acid, and in combination, generally with lime, forming a veritable salt, constitutes ordinary soluble gum. To confirm this view, M. Fremy carefully examined natural gum. It was previously known that gum cannot, in any case, be purified from the inorganic bodies which it contains, and that, upon calcination, it always leaves a calcareous ash amounting to 3 or 4 per cent. Moreover, mucilage always furnishes a precipitate with oxalate of ammonia. When solution of gum is treated with subacetate of lead, an insoluble compound is formed, and under these circumstances the lime is separated from the organic acid, and remains in solution combined with acetic acid. When metagummic acid is boiled with lime, a soluble substance is obtained identical with gum arabic; it is neutral, insipid, uncrystallizable, soluble in water, and precipitated by alcohol and subacetate of lead; calcined, it leaves an ash, amounting to 3 per cent., like gum arabic.

All these facts demonstrate that gum is really a compound of lime with an organic acid, and not an immediate neutral principle. By the action of oxalic acid the lime may be separated from gum, without the production of metagummic acid. This transformation may, however, be then readily effected by the application of heat. M. Gélis has made an interesting observation on gum arabic. He found that by a temperature of 150° Cent., sustained for many hours, gum becomes insoluble in water, but that by subsequent prolonged boiling it passes back again to the state of ordinary gum. Under these circumstances no elimination of lime takes place, but the gum or gummate of lime undergoes an isomeric modification, and metagummate of lime is produced. It may therefore be readily comprehended why the body obtained by M. Gélis is reconverted by the simple action of boiling water, while metagummic acid, obtained by the method described, is only transformed under the influence of bases. Considering the very feeble saturating power of the class of acids to which these bodies approximate, it is not astonishing that the lime salt should only contain three per cent. of lime. M. Guérin-Vary has shown that the gum of the cherry-tree contains a soluble substance, which is identical with gum arabic, and also that the insoluble gelatinous substance or cerasine is, by prolonged ebullition, rendered soluble, and converted also into gum arabic. M. Fremy shows that the alkaline carbonates react rapidly upon the cerasine, giving rise to carbonate of lime, and a gum entirely comparable to that obtained by the direct action of the base on metagummic acid. The dilute acids in the cold decompose cerasine, removing the lime and eliminating metagummic acid, which, by boiling with lime, yields ordinary gum. Cerasine, then, is not an immediate

neutral principle, but a combination of lime with metagummic acid. It is identical with the insoluble product obtained by M. Gélis in heating gum to 150° C. The two bodies reproduce gum arabic under the same circumstances. This transformation, which is effected by the action of boiling water, may also take place under the influence of vegetation; it is therefore natural to meet in the vegetable organism with mixtures of gum arabic and cerasine—they constitute two isomeric states of the same lime salt.

There remain other gums, such as tragacanth, which are apparently distinct from the preceding in their properties and their constitution. It results from M. Fremy's experiments that tragacanth contains an acid gelatinous substance, presenting a certain analogy to metagummic acid, but which is nevertheless distinct. When the insoluble matter of gum tragacanth is submitted to the action of the alkalies and alkaline earths, veritable gummy substances are obtained, soluble, insipid, uncrystallizable, insoluble in alcohol, like gum arabic, but precipitated by neutral acetate of lead, which, as is known, has no action on ordinary gum. It results, then, from these latter observations, that the gelatinous bodies contained in the gums may be converted into soluble compounds by the action of boiling water or bases, but that the resulting substances do not always present identical properties.

The soluble gums, true lime compounds, appear then to be derived from several gelatinous principles, and constitute several terms of the same organic series.

M. Fremy sums up the results of his investigations as follows:—

1. Gum arabic is not an immediate neutral principle; it must be considered as a combination of lime with a very feeble acid, soluble in water, and named *gummic acid.*

2. This acid may undergo an isomeric modification and become insoluble, either by the action of heat or by the influence of concentrated sulphuric acid. It is then named *metagummic acid.*

3. The bases, and principally lime, transform this insoluble acid into gummate of lime, which presents all the chemical characters of gum arabic.

4. The soluble lime compound which forms ordinary gum, may also undergo by heat an isomeric modification, first shown by M. Gélis, and is transformed into an insoluble compound, which is metagummate of lime. This insoluble substance is rendered soluble by the action of boiling water, or under the influence of vegetation. It exists in the vegetable organism; it forms the gelatinous part of certain gums, as that of the cherry; it is found in the ligneous tissue, and in the fleshy pericarp of several fruits. Its isomeric modification illustrates the formation of soluble gums.

5. There exists in the vegetable organization several insoluble gelatinous bodies, which by their transformations produce different gums. Thus, the insoluble part of gum tragacanth, modified by the action of alkalies, gives a gum which must not be confounded with gum arabic. Reagents establish a striking difference between these bodies.

6. When it is seen with what facility gum and its derivatives may, by undergoing an isomeric modification, be transformed into insoluble substances, a hope arises that a practical application in the arts may result, and that it may be employed like albumen for fixing insoluble colours.

On the Green Colouring Matter of Leaves.—M. Fremy has also furnished an important contribution to our knowledge of the substance hitherto known as *chlorophyll*, which constitutes the green colouring matter of plants. This body has been repeatedly submitted to investigation, but with very unsatisfactory results; by some it has been represented as an immediate principle, while other experimenters have regarded it as a mixture of several bodies. M. Fremy undertook the subject for the purpose of ascertaining if the colour was produced by a single substance, or if it was due to a mixture of a blue with a yellow body. His first experiments were made with hydrated alumina, increasing or diminishing its affinity for the colouring matter by additions of water or alcohol. He considered that if two colouring matters were present they would possess different amounts of attraction for the alumina, and that he might be able, in this way, to combine one while the other remained in solution. Some precipitated alumina was introduced into an alcoholic solution of the colouring matter of leaves; the chlorophyll remained entirely in solution, and no combination took place, but by the successive additions of small quantities of water a point was reached when the affinity of the alumina was exerted, and a portion of the colouring matter was separated. By suitably varying

the conditions of these experiments, the partial decomposition of the original colour was effected, the yellow colouring matter appearing to have the least affinity for the alumina. When the liquid was very alcoholic, a very deep green lake was obtained, while the liquid remained of a beautiful yellow. When, on the contrary, the liquid was very considerably diluted with water, all the colour was removed, and a lake produced of a yellowish green, precisely resembling the colour of the original leaves. This lake, digested in sulphide of carbon, yielded a portion of the yellow to the liquid, and was deepened in colour. Ether, alcohol, and turpentine acted equally upon the whole of the colour, and extracted a green of the original tint. If the latter solvents were employed after the sulphide of carbon, they extracted a bluish green.

The author next attempted to effect the reduction of the colour in such a manner that he could afterwards restore it, in the hope that at the moment of restoration he might be able to separate it into its constituents. This reduction was readily effected by the action of bases, which converted the green colour into a fine yellow. The latter may be dissolved by alcohol; it may also be combined with alumina, forming a fine yellow lake, yielding its colour to alcohol, ether, and sulphide of carbon. By submitting its alcoholic solution to the action of acids, particularly hydrochloric acid, the green colour was restored. The required reaction, therefore, was found. The green colour of the leaves could by this means be decomposed, and restored again at pleasure. It remained to effect the separation of the two colours (assuming that the green was really produced by a mixture of a blue and yellow) at the moment of restoration. This was effected as follows:—Into a stoppered bottle was introduced two parts of ether, and one part of hydrochloric acid, diluted with a small quantity of water, the two well shaken together, so as to saturate the acid with the ether. The body resulting from the decoloration of the chlorophyll was then introduced, and agitated for some seconds, when, as the two liquids, the ether and the acid, separated from each other, it was seen that the ether had taken all the yellow, while the hydrochloric acid, reacting on the decoloured portion of the chlorophyll, had produced a magnificent blue. M. Fremy has given the name *phylloxanthine* to the yellow matter, soluble in ether; and *phyllocyanine* to the blue substance remaining dissolved in the acid. The yellow body resulting from the alteration of the phyllocyanine he calls *phylloxanthéine*. He afterwards found that unaltered chlorophyll, such as is obtained by simple extraction with alcohol, or even dried green leaves themselves when treated with the acid and ether, was decomposed and separated into the blue and yellow. The author then examined the yellow matter found in young shoots and etiolated leaves, and he found it to correspond with the body resulting from the decomposition of chlorophyll. Treated with ether and hydrochloric acid it yields a blue; exposed to the vapour of acid the leaves assume a bright green.

The yellow leaves of autumn, on the contrary, contain no phyllocyanine; their colour is entirely due to the phylloxanthine. M. Fremy sums up as follows:—

1. The green substance of leaves may give rise to a blue and a yellow matter.

2. These colouring substances form insoluble combinations with alumina, in which the affinity of the alumina for the colouring matter admits of being variously controlled.

3. The blue matter of the chlorophyll is more susceptible of change than the yellow; under varied influences the blue colour is destroyed, and may be again restored.

4. The study of these phenomena of bléaching has led to the splitting of the green colour of leaves into a blue and a yellow, and of fixing these colours in two different liquids.

5. By comparing the yellow colour of etiolated leaves with the green colour of insolated leaves, he has demonstrated that the body which results from the decolouration of phyllocyanine, and which reagents produce so easily, exists in the vegetable organization; it precedes the green matter; it is found in the young shoots and the etiolated leaves; it is immediately coloured blue by the vapour of acids. These coloured substances present then between themselves very simple relations, and are probably derived from the same principle.

COLLECTION OF SCAMMONY IN THE NORTH-WEST OF ASIA MINOR.

BY M. CH. BOULIER,
Professor at the School of Medicine in Algiers.

My observations have been made between Brusa and Boli, and principally in the cantons of Gulbazar, Gheve, Terekli, and Corbaly, in July, 1856.

It is at the end of June and commencement of July, at the period of the flowering of the *Convolvulus Scammonia*, and after the collection of opium and silk, that the Asiatic peasant is occupied with scammony. The plant which furnished this gum-resin is not cultivated, but it grows in a wild state in stony places covered by brush-wood, which has the effect of preserving the soil in a somewhat moist state during the dry season, and of allowing the stems of the scammony plant to intertwine themselves in its branches. The plants of *Convolvulus Scammonia* in these waste places are always grouped about some bushes; they are never found in open places: hence the collection of this drug is often very difficult.

The period having arrived for its collection, the scammony seekers survey the mountains for several days to find the localities richest in the *Convolvulus*. Having ascertained this point, they return to the village, where they provide themselves with a hatchet-pickaxe, a large cutlass, some mussel-shells, and a copper vessel lined with tin. Having arrived at the place of collection they clear away, by means of the hatchet, the convolvuli from the branches and from the roots of the oaks or shrubs which protect them; with the pickaxe they then dig deeply all round the root until it is almost bare; arming themselves then with their knife, with a large and sharp-cutting blade, they cut the root rapidly in a bevilled manner at from 3 or 4 centimetres from its neck, or, on an average, about $1\frac{1}{4}$ inches. They stick immediately a little under the lower lip of the wound a mussel-shell, in which the milky juice as it flows away from the cut surface accumulates. It is this juice inspissated which constitutes scammony.

This is, after all, nearly all the work necessary for the collection of scammony. However easy it thus appears at first, one is astonished, when he goes to perform it, at obtaining an inferior produce to that which is obtained by the natives. This depends in some degree upon the importance which they attach to the details of the operation. In order to succeed completely it is necessary to leave only a very small portion of the root deposited in the soil; to beware of wounding with the pickaxe the epidermis of the root; to effect the section at a single blow, taking care at the same time to press the blade upon the upper face of the section, so as to leave perfectly gaping the openings of the vessels on the lower face. We obtain by operating in this way the largest produce.

As soon as the mussel-shell is fixed to the root the peasant passes to other plants, which he operates upon in the same manner. In about half an hour he returns to the first root to commence the collection of the juice which has flowed from it; in order to do this he lifts up the shells and turns their contents into the tinned copper vessel which he carries before him.

At the end of the day the scammony seeker has collected a quantity of juice, but this does not represent the whole of what is afforded in a day's work, for all the juice which has dried on the surface of the wound is not collected until the next morning. The first occupation of the second day of collection and all the following ones is to pass over all the roots operated upon the night before, and to remove the hardened juice by scraping them with the blade of a knife.

When the copper vessel is filled with the scammony juice, the peasant carries it to market, if it is not sold beforehand, and there the buyers of scammony pay him in proportion to its dryness and purity. These buyers throw together in boxes, holding from 10 to 20 litres (from nearly $2\frac{1}{4}$ to $4\frac{1}{2}$ gallons), all the quantities of juice which they have received from the different villages. These boxes are afterwards forwarded to the wholesale druggists at Smyrna or Constantinople. The scammony arrives at the markets in a pasty condition, perfectly like in the whole to white drained cheese. The upper part of the mass in contact with the air has acquired a resinous consistence, and presents a bottle-green or yellowish-red colour. The buyer never takes scammony without having previously minutely examined it. He seeks, first, the presence of earthy matter. It is always at the bottom of the vessel that this foreign matter is met with, as its density causes it to accumulate there. According to its abundance, scammony, instead of its usual whiteness, presents a hue which varies from grey to deep black.

Nevertheless, scammony can have its whiteness preserved, and, at the same time, be adulterated, either by the yolk of eggs, or by cheese and starch, or, still better, by mineral substances, such as carbonate of lime, sulphate of lime, &c. The means recognized as infallible by the buyers of scammony in Asia (for ascertaining its purity) are as follows:—They take a portion of the pasty juice of the scammony plant, work it up, draw it out gently at first, and then break the mass quickly by

a rapid lengthening. *Pure scammony breaks clean or short, and the surfaces resulting from the fracture are perpendicular to the great diameter of the mass; they present, also, a waxy appearance, and are always perfectly smooth.*

An extensive experience enables the buyers to recognize very quickly the substances introduced by fraud; but it is known that these men, who are all Greeks or Armenians, do not use their skill to discover the adulteration in order to refuse the adulterated product, or at least to separate it from the pure product, but expressly for the purpose of paying a less price for this substance of inferior quality, which they mix directly afterwards with the best samples. We repeat, and we have verified it many times, as frequently in the case of opium as in that of scammony, that the Turkish peasant, who is the sole collector of these substances, is generally very honest, and adulterates but little.

All the products of the East which come to us so different in quality and appearance have always passed through the hands of Greeks or Armenians.—*Gazette Médicale d'Alger*, and *Journal de Pharmacie d'Anvers*, December, 1859.

ON WATER-GLASS, AND SOME OF ITS APPLICATIONS.

BY DR. JOHAN N. FUCHS.

(*Concluded from page* 480.)

a.—CARBONATE OF LIME.

(*Chalk, Calcareous Sand, Powdered Marble.*)

When chalk-powder is made into a paste with water and then well dried and saturated with water-glass, it forms a compact mass. According to Buchner, if a piece of chalk is plunged into a moderately concentrated solution of water-glass, and left for about two days in the solution, and then taken out, dried, and again put into a somewhat more dilute solution, it is found to be entirely soaked with it, and acquires on drying such an even hardness that it is very little inferior to marble, and capable of a good polish. Water does not soften it, though it assumes a slight alkaline reaction; the chalk is also increased considerably in density. Baron Liebig and Professor Buchner have confirmed this remarkable deportment of water-glass by their own experiments. Chalk, therefore, forms an excellent ingredient in order to render water-glass cohesive and insoluble in water.

The question will be asked, what produces this remarkable change in the otherwise soluble water-glass? Is it in consequence of a chemical process, *i. e.* does an interchange of the elements of carbonate of lime and water-glass take place, so that on the one hand silicate of lime, and on the other carbonate of potash, are produced?

The change of the water-glass is no doubt of such a kind, that Professor Kuhlmann may well be excused for holding the opinion that it is based upon a chemical process. This is not the case, however, as I have already stated in the pamphlet referred to, p. 400: "Several insoluble salts, such as carbonate and phosphate of lime, which do not possess the power of decomposing the water-glass, have so strong an attraction for it, that when it is evaporated with them, it loses its solubility in water, either partially or wholly."

Baron Liebig and Professor Pettenkofer have lately proved beyond all doubt, by numerous carefully conducted experiments, that no chemical interchange of elements takes place, and that not even a partial decomposition of the water-glass is perceptible.

Is, then, this extraordinary change merely caused by adhesion? I think that the water-glass and carbonate of lime combine directly, *i. e.* without a mutual decomposition, forming a weak chemical compound such as is met with in the mineral known by the name of "cancrinite," which is composed of nepheline (silicate of soda and alumina) and carbonate of lime. A silicate of analogous composition has been discovered by Professor Schafhäutl in Tyrol, and called by him "didymite."

Cases are known, moreover, of undoubted adhesive action, in little or no way inferior to chemical action. I will only mention iron flint, which to all purposes is a mixture of oxide of iron and quartz; the former adhering, however, so firmly to the latter, that the strongest hydrochloric acid does not dissolve the whole of the iron from a finely powdered ferruginous quartz, even on long continued boiling, as has been shown by the experiments of Bucholz.

Powdered marble exerts the same action upon water-glass as chalk, and forms a

very compact mass with it, especially a very good cement. This cement, which may be prepared of more or less coarsely-powdered marble, may find useful application for many practical purposes, as well as the analogous mass of chalk and water-glass, since it adheres to wood as well as to stone.

b.—DOLOMITE.

A mineral consisting of carbonate of lime and carbonate of magnesia, which, according to experiments lately made, appears to surpass even limestone in its cementing power; and as it is considerably harder than limestone, a mixture of its powder with water-glass imparts a strong resisting powder against external, mechanical, as well as chemical action. It may be classed with the best means of cementing the water-glass and to render it insoluble in water; and since it occurs frequently in nature, it may be obtained without incurring any great expense.

c.—PHOSPHATE OF LIME.

(*Bone-ash.*)

Phosphate of lime also gives a very compact mass with water-glass, scarcely differing in consistency from that with carbonate of lime, and, as far as has been ascertained, without undergoing any chemical action or change of its constituents. Although it is not likely that phosphate of lime will be much employed, it is interesting to know its deportment with water-glass, because it is sometimes formed by the combination of phosphoric acid and lime and brought into contact with water-glass, as will be further illustrated hereafter.

d.—CAUSTIC LIME.

(*Slaked Lime.*)

Water-glass sets rapidly when caustic lime is mixed with it, and dries slowly to a rather hard mass. A chemical combination takes place between the lime and water-glass, and potash is liberated, if a sufficient quantity of water-glass be present. It is evident that water has no action upon this product. It may serve advantageously as an admixture to other masses which do not cement so well; only little can be added, however, lest the solution sets and prevents the water-glass from penetrating.

e.—LIME ACTED UPON BY THE ATMOSPHERE.

(*Basic Carbonate of Lime.*)

May conveniently be added to water-glass by rubbing the two substances together; it does not set rapidly, but dries up gradually to a solid mass, which is a chemical product consisting of silicate of potash and lime. Slaked lime forms a useful addition to other masses, since it will soon be converted into carbonate of lime by the action of the carbonic acid of the air, and walls coated with mortar may, after a short time, be impregnated with water-glass in order to cement them better.

f.—PULVERULENT QUARTZ.

Quartz may be powdered as finely as possible without exhibiting any strong adhesive power or inclination to form a cement with the water-glass. If it be made into a kind of cement, and placed upon a tile moistened with water-glass, it dries up to a solid mass after a few days, and resists rain and becomes as hard as a stone on the surface. But if that surface is pierced and the inner part examined, it is found quite disintegrated and void of water-glass, the whole of which has been drawn to the surface. Repeated soaking in water-glass is necessary to render the mass homogeneous. A compact mass which leaves scarcely anything to wish for, is however obtained when a little dry-slaked lime is mixed with the powdered quartz, and then the mixture treated with water-glass.

The same takes place when water-glass is added to mortar made with quartz-sand and slaked lime, after the mass has been well dried.

g.—BURNED CLAY, AND BURNED PORCELAIN CLAY.

These two bodies do not belong to those which bind well with water-glass. We observe the same action as with powdered quartz. The water-glass only combines superficially with them, and leaves underneath a porous powder, which will only bind if repeatedly moistened with water-glass.

There exists a remarkable difference between vessels made of different kinds of clay, which become, as is usual, porous by burning, so that they absorb the water-glass readily. If, for instance, a burned plate of potter's clay which possesses no particular hardness, and can easily be broken to pieces, is saturated with moderately concentrated water-glass, and if the soaking is repeated after it has become dry, it is rendered so hard that it resists both chemical and mechanical action which is

made to bear upon it. Thus Professor Kaiser prepared a plate of tile clay about half an inch thick, which was so friable that it would have fallen to pieces under the slightest pressure before being saturated with water-glass, and used it as a covering plate in an evaporating oven; and although vapours of all kinds have been passing over it for the last twelve years, they have not produced the slightest change. It is evident that potter's ware of various kinds can be rendered as durable as a plate of clay, provided they take up the water-glass readily.

h.—ZINC WHITE (OXIDE OF ZINC) AND MAGNESIA.

These two bodies combine most energetically with the water-glass, and hereby show the same close analogy which we notice in several others of their natural as well as artificial chemical compounds.

Oxide of zinc may be ground together with water-glass without setting too rapidly. If this mass is spread rather thickly upon a slab moistened with water-glass, it contracts slowly and becomes gradually harder till it breaks up into many small pieces, which detach themselves from the support. When treated with water, these pieces retain their hardness and are no longer disintegrated; they impart a weak alkaline reaction to the water. It is evident that oxide of zinc forms an intimate chemical compound with water-glass.

If the mixture of oxide of zinc and water-glass is brushed in a thin layer upon objects, it adheres firmly to them and gives a good coating, to which a colour may be added, if desired.

This powerful action of the oxide of zinc makes it a very useful article to add to those substances which, by themselves, do not bind readily with water-glass. Even to those that do, a small admixture of the salt can be advantageous, and tends to increase the solidity, or, at all events, prevents the water-glass from making its way to the surface.

Pure magnesia, also called *Magnesia usta*, from the way it is prepared (by igniting pure carbonate of magnesia), when ground together to a paste with concentrated water-glass, sets more rapidly than a mass of oxide of zinc and water-glass, and dries up to a very hard mass, but it is liable to crack and peel off when it is put on a solid body in a layer a little thicker than a card-board. The pieces which peel off exhibit considerable hardness. Water in which they have been boiled has an alkaline reaction, but gives no cloudiness with sal-ammoniac, a proof that only a little potash, but no silica, or merely a trace, is dissolved.*

I have no doubt that magnesia as well as oxide of zinc combine chemically with water-glass, and that the former may conveniently be employed as an additional ingredient to other masses which possess less binding power.

Experiments have been made with *Magnesia alba* as an admixture to water-glass, which have proved perfectly satisfactory. This kind of carbonate of magnesia was made into a paste with concentrated water-glass, and placed upon a glass plate; it soon acquired considerable solidity, and adhered so strongly to the plate that it could only with difficulty be detached by means of a knife. A few pieces were put into water and digested for a short time; it dissolved a little carbonate of potash but no silica, which would have been indicated on the addition of sal-ammoniac. The consistency of the mass was not perceptibly altered. A part of it was powdered and boiled with water, when again traces of carbonate of potash only were found to be dissolved. Another portion was treated with dilute sulphuric acid, which gradually produced a slight effervescence, dissolving magnesia and the rest of the potash, and leaving behind silica as a gritty powder, which was perfectly and easily soluble in caustic potash.

Magnesia alba and water-glass undergo, therefore, a chemical action, by forming a little carbonate of potash, whilst silica, with a part of the potash, combines with the magnesia. Magnesia alba forms, therefore, one of the most important cementing ingredients which can be added to water-glass.

GYPSUM.

Hydrated Sulphate of Lime ($CaO, SO^3 + 2HO$).

When gypsum is ground together with water-glass it solidifies immediately, and on drying, much sulphate of potash or sulphate of soda separates, according as potash

* It is by no means remarkable that a little potash is dissolved on grinding this or a similar mass with water, since it has been found that common glass is slightly soluble in water when ground for some time in an agate mortar.

water-glass or soda water-glass has been employed in the experiment. The mass is, however, scarcely more solid than the ordinary gypsum. No doubt, a chemical action has taken place. It follows that objects made of gypsum cannot be impregnated with water-glass in order to render them more solid and capable of resisting the action of the atmosphere, because it does not penetrate into the pores. Gypsum must therefore be avoided in selecting admixtures for the water-glass; moreover, care must be taken to avoid such bodies as might form gypsum in the operation, or as might already contain gypsum.

Anhydrite, or anhydrous sulphate of lime, and, I think, strongly ignited gypsum, promise a better result; but I am unable to speak definitively on this point, as the experiments have not yet been brought to a conclusion; and I hope to be able to publish some interesting results with regard to the action of that and other substances upon water-glass, viz. heavy spar, fluor-spar, oxide of iron, basic salts of iron, litharge, lead-white, &c.

The state of concentration of the water-glass is a matter of considerable importance in these experiments, and still more so in its practical application.

One part by measure of concentrated water-glass to two parts of water, may form the maximum, and one part of the same water-glass to half a part of water, sometimes even less, according to circumstances, the minimum of dilution. If it is too concentrated, it does not penetrate those bodies easily and sufficiently which it is desired to impregnate; if it is too diluted and made into a paste with pulverulent bodies, this mass may appear coherent enough when first dried, but will be found more or less friable and loose after a few days, and repeated impregnation with water-glass only can impart to it the desired solidity. Dilute water-glass interposes too much between the particles of a body, so that numerous small interstices are left, which weaken the cohesive power when the water-glass contracts on drying. All depends upon how far the saturation of such bodies with water-glass is to be carried on—whether they are to be completely saturated with it, or only to a certain degree. In the first case we attain the greatest possible solidity; in the second we gain the advantage that colours or a coating of paint can be put on at any time and fixed by means of water-glass. It must be left to the operator to modify at will the state of concentration, and to adapt it to his purpose. I will merely state, that a body which has been completely saturated with water-glass can be again rendered porous by warming it, or, what is easier, by burning alcohol once or twice on it.

The pores open a little more in the course of time, especially on exposure to rain, which dissolves part of the alkali and leaves principally silica, so that at last complete petrifaction takes place, and the desired object is attained.

The question will be asked, which of the several kinds of water-glass answers best, and is the most suitable for practical purposes? Nothing definite can be stated as yet. It is possible that the potash water-glass, which sets more rapidly than soda water-glass with powdered substances with which it is mixed, may impart greater solidity to them than soda water-glass; the difference, however, cannot be considerable. On the other hand, the soda water-glass has the advantage of being more liquid, and penetrating more readily into the smallest spaces, pores, and fissures, than the slightest gelatinous and difficultly soluble potash water-glass, a property which is of some importance to the sculptor and mason.* Soda does not combine so strongly with silica as potash, and has a strong inclination to efflorescence when combined with the carbonic acid of the air; and one of the advantages of soda water-glass might be due, therefore, to its parting readily with the silica, and thus accelerating the silicatization of the mass. Further experiments, however, are required to prove its superiority.

The double water-glass seems to unite the properties of the other two, and merits preference, for the very reason that it contains two bases (potash and soda) with which silica (which prefers to form double compounds) combines more powerfully.

The fixing water-glass is used for the particular purpose already stated, but it can also be employed in many other cases, especially in painting.

The first three kinds of water-glass, when completely saturated with silica, are

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* The late sculptor Professor Maier told me, that he was enabled to employ a faulty stone in a few days as if it had contained no fissure, by dropping a few drops of soda water-glass into the crevices. He could not employ potash water-glass equally well, since it was not so liquid, and did not penetrate into the fissures.

always more or less cloudy or opaque, owing to undissolved and very finely divided silica.

In order to deprive them of this opacity, it is sufficient to add a little liquor silicum, and to allow them to stand for about a day, stirring them occasionally. The opacity disappears completely, and the liquid becomes perfectly clear, provided it be not accidentally coloured by some other (organic) substance.

I have further to remark, that after some time a dust-like efflorescence, sometimes of slightly crystalline appearance, takes place upon bodies which have been impregnated with water-glass. This efflorescence has frightened many, and caused the water-glass to be looked upon with suspicion. But this efflorescence is far from being obnoxious; it proves rather that the process of hardening proceeds favourably, by which a little alkali is expelled, thus enabling the silica, which no doubt forms the principal binding element, to act more freely upon the bodies to which the water-glass is applied.

If the efflorescence is removed by means of a wet sponge, it will be found that the solidity of the body thus treated is not only not impaired, but even increased.

I thought at first that this efflorescence* consisted of bicarbonate of potash, because it was derived from potash water-glass, but more careful examination by M. Feichtinger, assistant in the chemical laboratory of Professor Pettenkofer, proved it to be carbonate of soda mixed with scarcely a trace of potash. All commercial potash derived from the ashes of plants—and such was the potash employed in the manufacture of this water-glass—contains more or less carbonate of soda, and thus the occurrence of carbonate of soda can be easily accounted for.

INFLUENCE OF SCIENCE ON THE ART OF CALICO PRINTING.

BY F. C. CALVERT, ESQ., F.R.S., &c.

The following is a short abstract of a lecture on the above subject, delivered at the Royal Institution, Feb. 17th. The author stated that calico printing was based on three distinct branches of knowledge—mechanics, art of engraving, and chemistry.

After describing the remarkable progress in the art of calico printing, consequent on the various mechanical improvements which, since 1815, had gradually supplanted hand labour, Professor Calvert observed that the discovery which had exercised more influence than any other on this art, was the application of chlorine gas as a bleaching agent. Previously to the application of this gas (chiefly as bleaching powder) the imperfect bleaching of a piece of cloth required six weeks, whereas now the same result was obtained, far more perfectly, in twenty-four hours. Allusion was then made to the interesting fact that abstract science had brought to light some substances of great value to the calico printer—such as the discovery, by Dr. Prout, of *murexide*, and that of *alloxan*, by Liebig and Wöhler, both of which substances were for twenty years only to be found in the laboratory; but, in 1851, Dr. Saac observed that alloxan, when in contact with the skin, tinged it red, and this led to its application as a dye. Subsequently, murexide was employed successfully in dyeing wool and silk, and in printing calicoes, by the aid of oxide of lead and chloride of mercury as mordants; but the great obstacle to its extensive use was the difficulty of obtaining uric acid in sufficient quantity, until guano was employed as a source from which the chief supply of uric acid was now obtained. Another example given was the discovery of the *mauve* colour. Lichens had been the subject of extensive researches, and had yielded several new and colourless organic substances, which, under the

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* This efflorescence is by no means identical with that which frequently occurs on damp walls, and which acts so destructively by loosening the plastering or cement, or by detaching it all together, and which is most appropriately called "Mauerfrass." The latter is caused by salts which are contained in the material employed for building walls, most frequently by saline bodies found in the spring water which is used in preparing it. Not unfrequently saltpetre is formed simultaneously. This evil abates only when all the salts present in the mortar have effloresced. Another source of the decay of walls is to be found in the damp or saline soil upon which the walls are built, and from which the wall absorbs the salts unceasingly. A fresh coating of cement, after carefully removing the old, will improve the appearance of the wall, but only in order to furnish fresh material for slow destruction. A coating of water-glass cement, put on after carefully cleaning and impregnating the damaged wall with concentrated water-glass, can alone efficiently stop the destruction for a longer period of time.

influence of air and ammonia, gave rise to most brilliant colours. Dr. Stenhouse, in an elaborate paper, published by the Royal Society, in 1848, pointed out two important facts—first, that the colour-giving acids could be easily extracted from the weed by maceration in lime water, from which the colouring matters were easily separated by an acid; and, secondly, the properties of certain colouring acids, which gave the clue to the production from lichens of a fast mauve and purple, which, up to 1857, had been considered impossible to be obtained. *Kyanol*, one of a series of substances obtained from coal tar, was examined by Dr. A. W. Hofmann, and proved to be identical with the substance known by the name of aniline. In consequence of the subsequent discovery that it yielded a beautiful purple colour when in contact with bleaching powder, Mr. W. H. Perkin was induced to make some experiments with a view to producing a fast purple, in which he succeeded, and secured it by a patent in 1857.* More recently, Mr. Renard produced from aniline, by means of chlorine compounds, a rose colour, called by him *fuchsiacine*. Mr. David Price also produced *roseine* from aniline, by the employment of peroxide of lead.

All these colours require some special mordant to fix them on calicoes or muslins.

As bearing on this subject, we subjoin a short description of the manner of producing the more important of the dyes alluded to, for which patents have recently been obtained:—

Aniline Dyes.—The process patented by Messrs. Beale and Kirkham consists in taking "a salt of aniline in solution, or a saturated solution of aniline in water, and adding thereto an equal quantity, by measure, of acetic acid. To this acid solution, a solution of chlorine or of a hypochlorite, as bleaching powder, is added, when the change of colour takes place and the liquid dye is produced. By varying the proportions and strengths of the materials, a variety of colours and shades may be produced. The liquor thus obtained may be used at once to dye blue; but if it be kept for a few hours it will dye purple and lilac. The dye, after the exhaustion of one colour, may be used for others, from blue, violet, and lilac, down to slate, brown, and straw, by the addition of more or less chlorine or hypochlorite. The proportions given are, one measure of saturated aniline water, one measure of acetic acid, of five strengths, and one measure of hypochlorite of lime, sp. gr. 1010. The last must be added carefully to produce the shade of violet blue required. Instead of using the hypochlorite, chlorine may be passed through the acid solution of aniline, it being carefully watched in order that the supply of gas may be arrested when the required effect has been produced. Or, take one measure of hydrochlorate of aniline, sp. gr. 1010, one measure of acetic acid, and one measure of hypochlorite of lime, sp. gr. 1010, the last being carefully added in small quantities as before. This will produce a violet blue dye, and after a time lilacs, just as the former."

The following is the process for obtaining red dyes (*fuchsiacine*) patented by Mr. Brooman:—

"The inventors boil for fifteen or twenty minutes a mixture of aniline and anhydrous bichloride of tin. At first the mixture assumes a yellow, then a reddish tint, and finally changes to a beautiful red. The mixture is liquid while hot, but when cold becomes gelatinous. The gelatinous mass is boiled with water, and filtered hot; and the colouring matter is precipitated from the filtered liquor as it cools. To completely separate this colouring matter, the patentee dissolves in the liquor either a tartrate, acetate, an alkaline or earthy chloride, an alkaline phosphate or pyrophosphate, or chloride of mercury, which precipitates the whole of the colouring matter. For dyeing, either the solution obtained by boiling the mixture in water, or the solid colour dissolved in water is used. The usual mordants, except the mineral acids, may be used with it. To obtain a solution sufficiently strong to print with, the mixture of aniline and bichloride of tin is treated while hot with acetic acid, alcohol, or wood spirit, and the colouring matter is precipitated as before described. Another red dye is produced by mixing with aniline bichloride of mercury, perchloride of iron, or protochloride of copper, and treating this mixture as the former."

By the action of peroxide of lead on aniline, under Mr. Price's patent, three colours are produced, the difference of tint depending on the extent of oxidation of the aniline. The following are the proportions used:—

Violine.—1 equivalent of aniline, 2 equivalents of sulphuric acid, 1 equivalent of peroxide of lead.

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* The process adopted is described at page 144 of our present volume.

Purpurine.—2 equivalents of aniline, 2 equivalents of sulphuric acid, 1 equivalent of peroxide of lead.

Roseine.—1 equivalent of aniline, 1 equivalent of sulphuric acid, 2 equivalents of peroxide of lead.

Purple and Rose-red Murexide Colour.—In seventy-two pounds of boiling water, twenty-four pounds of crystallized nitrate of lead are dissolved, and when the solution has cooled to 144° F., five pounds of dry, powdered, or fifteen pounds of pasty murexide are dissolved in the fluid, and afterwards thirty-six pounds of finely powdered gum; after which the whole is passed through a fine sieve, and left to cool, in which state it may be employed either for hand or roller printing. The pieces of stuff to be dyed, having been treated with gaseous ammonia, are then passed through the sublimate bath, containing two pounds eleven ounces of corrosive sublimate in fifteen hundred pounds of water, they are then hung in flowing water, and afterwards passed through the acetate of soda bath, consisting of one pound each of acetate of soda and muriate of ammonia in three thousand pounds of water.

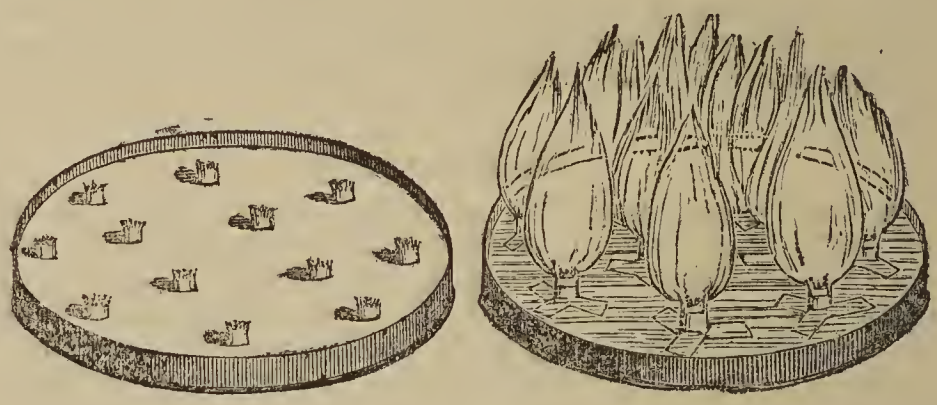
MISCELLANEA.

The Jacob Bell Memorial.—The universal respect and admiration of the character of the late Jacob Bell, President of the Pharmaceutical Society of Great Britain, among the Pharmaceutists of England and Scotland, has vented itself in the idea of establishing a memorial in the form of two Scholarships in the School of Pharmacy of that Society, and already about $8000 have been subscribed for the purpose intended. Even the London College of Physicians have taken part in it, and have expressed their approval of the plan. No more appropriate offering could have been suggested in honour of a man whose sacrifices and devotion to his profession are perhaps unrivalled in the annals of Pharmacy ; certainly none which would have been more in consonance with the feelings of the honoured dead.—*Amer. Jour. of Phar.*

Spurious Gold.—The case of Wee Qua, the Chinaman, convicted at Ballarat, and sentenced to twelve months' imprisonment with hard labour, for the sale of spurious gold, manufactured by himself, demands full publicity in a gold-producing and gold-buying country. From Dr. Mac Adam (formerly of Glasgow), who was professionally engaged by the Government for the prosecution, we have received the following account of the matter:—The spurious dust, of which we have had the opportunity of inspecting a sample, is, to a casual observer, utterly undistinguishable from the genuine article. Even its weight is so great as to deceive : though on examination its specific gravity is found to be only two-thirds that of genuine gold. The mechanical imitation of gold-dust shows remarkable care and painstaking in the manufacture. There are three clearly distinguishable forms :—1. Small nuggets, made by casting the alloy through a plate with largish holes, into water, whereby the irregular nuggety form is obtained. 2. Smaller pieces, like flattened shot, made by casting through smaller holes into water, something similiar to the process of casting shot. These pieces are afterwards flattened by a blow of a wooden mallet. 3. Small dust, apparently made by casting through a fine sieve. By mixing the above three shapes and sizes, a mechanical imitation of the usual forms of gold-dust is obtained, which deceives a purchaser who might detect any one of them if offered separately. The metal used for the manufacture of the whole of the three kinds is an alloy consisting chiefly of copper, a little silver, and a trace of gold. They are then covered with fine gold by the electrotype process. The final result is, that the spurious dust contains about eight per cent. of gold. So perfect is the coating of gold over the alloy, that the dust is not affected by either cold or boiling nitric acid (aqua fortis) of the greatest strength, even after being exposed to it for twenty-four hours. On removal of the smallest portion of the gold coating, the acid acts immediately and destroys the nugget. It seems then as if the dust, after electrotyping, has been subjected to a preliminary test, and all imperfectly covered pieces removed. The only effect of the acid is to clean and brighten the dust, which appears to have been intentionally dulled by the application of some kind of grease, so as to imitate the natural colour of gold as collected by the digger. Some muriatic acid, however, being added to the nitric acid, producing nitro-muriatic acid (commonly known as aqua regia), the gold coating is immediately removed, and the alloy destroyed rapidly, accompanied with evolution of the ruddy vapour of nitrous acid, and the formation of a dark green coppery solution. These particulars will serve to put our readers on their guard against this most ingenious fraud.—*Melbourne Leader.*

Gunja.—The Calcutta correspondent of the *Times* states: "A very heavy addition is to be made to the tax on 'Gunja', the extract of hemp, with which some classes of our population madden themselves. The drug is the most fatal stimulant used by man, destroying gradually the reasoning powers. It gives men, however, a momentary courage, and the fighting classes all keep it. Government is anxious to suppress it, as men under its influence have a *penchant* for committing murder; but, as a bolus, the size of one of Holloway's pills is sufficient for two doses, there is a limit to taxation."

Portable Hot-Air Bath.—At the suggestion of some members of the medical profession, Messrs. Price and Co. have introduced a portable hot-air bath, which consists of an arrangement of night-lights on a tin, as indicated in the following cut.



The manner of using it is to ignite the wicks, and place the heater under a cane-bottomed chair, on which the patient sits enveloped in a blanket.

On Castor Oil.—The castor-oil plant, or *palma christi*, grows spontaneously and very abundantly in Algeria, and it is there treated as a weed, and destroyed in the same manner as we do the couch-grass. Some Algerian colonists, better informed, have undertaken to cultivate this until now proscribed plant, and to turn it to account on a large scale in the rearing of silkworms, which are fed on its leaves. In addition to the cocoons of the silkworms, they have obtained by expression from the seeds a very rich yield of oil, as much as 1500 kilogrammes (about 1 ton 8½ cwt.) per hectare (2 acres, 1 rood, 35 perches).

If this oil could only be used in pharmacy, in which it is classed among the most serviceable purgatives, it would be impossible to open for it sufficient markets; but fortunately it will serve very well for burning, and even, it is said, for food, when it has been freed from the acrid principle, which makes it valuable as a medicine. When saponified, like the other oils, or simply submitted to distillation by steam-heat, it yields in addition a stearine or fatty acid of excellent quality. At the same time, the fibres of the plant, treated like the fibres of the hemp plant, become a textile material of some value.—*Cosmos*, and *Journal de Chimie Médicale*, August, 1859.

Adulteration of Santonine.—A young girl died lately in Brazil after taking six grains of santonine, in two equal doses, at two hours' interval. The Pharmaceutical Society had the santonine examined by two of its members, and it was found to contain twenty per cent. of strychnine.—*L'Union Médicale.*

Accidental Poisoning in France.—The two sons of the well-known Raspail, founder of a system of quackery known as the "système Raspail," possess a shop for the sale of medicines in the Rue du Temple, and they announce that there only the medicines prepared according to their father's method can be found. This shop is carried on by one Tessier, a licensed apothecary. On the 9th of December, a man, named Varenne, went to the shop for a dose of sulphate of magnesia, but by mistake Tessier gave him one of sulphate of zinc. Varenne was seized with severe abdominal pains, and other symptoms of poisoning, but recovered by the employment of antidotes. Tessier was brought to trial on the charge of what the French law calls injuring and wounding by imprudence, and the MM. Raspail on that of illegally selling medicines, they not being licensed apothecaries. The former was condemned to a month's imprisonment, 50 f. fine, and 300 f. damages, and the two latter each to a fine of 100 f.—*Lancet.*

Accidental Poisoning by Oil of Vitriol.—On Monday evening, March 5th, a

woman named Sarah Knowles, aged 42 years, of Ingbirchworth, near Penistone, died from a quantity of oil of vitriol having been administered to her in mistake for medicine. Deceased was ill of fever, and her husband had purchased the vitriol for the purpose of a disinfectant, and had put it in a medicine bottle, which was labelled as such. A female who was waiting upon deceased, in giving her what she thought was the medicine, by mistake gave her two tablespoonfuls of the vitriol. As soon as the mistake was discovered, the aid of Mr. Turton, surgeon, Denly, was procured ; but his efforts were of no avail, as, after continuing in great agony until Monday evening, the poor woman expired.

Poisoning by Corrosive Sublimate.—The following case is contributed to the *Medical Times and Gazette* by Dr. John Coghlan, of Wexford:—A stout healthy man, aged 19, was advised by a fellow-workman to dissolve a pennyworth of corrosive sublimate in a gill of whisky, and take one-eighth of the quantity three times a day. He purchased the sublimate of an apothecary at Wexford, who weighed out to him about 85 grains, and as it is commonly used for a variety of purposes, the apothecary simply labelled it "Poison," and desired him not to poison himself. He took rather more than one-fourth of a wine-glassful of the mixture, containing at least 12 grains of the sublimate. Within three minutes after taking it, he vomited, and continued retching violently, the mucus being streaked with blood, followed by frequent purging. The treatment adopted was as follows:—The feet were wrapped in warm flannel, a mustard plaster applied to the epigastrium, and a tablespoonful of a mixture of raw eggs and milk given frequently, and a mixture containing six drops of tincture of opium given every half hour, to allay the vomiting. The following day all the distressing symptoms had disappeared, and in a few days he had perfectly recovered.

Poisoning by Burnett's Disinfecting Fluid.—Mrs. Kendrick, a widow, proprietress of a chemist and druggist's business in Sherlock Street, Birmingham, a few days ago asked Mr. Frane, who has managed the business since her husband's death, for a dose of fluid magnesia, and at once took what he handed to her. He had, however, by mistake, poured out some of Sir William Burnett's disinfecting fluid. In spite of the best medical aid, Mrs. Kendrick died in great agony in a few hours.—*Medical Times and Gazette.*

Poisoning by Strychnine.—A youth, aged 16, was recently fatally poisoned at Yeadon, through taking strychnine which had been given him as a medicine by a grocer, who (the lad having recently come from Wales, and being unable to speak English very perfectly) understood him to ask for vermin powder. The packet was properly labelled with the word "Poison," but the youth, immediately on his arrival home, had pulled off the outside wrapper, and thrown it into the fire.

Suicide by Laudanum.—On Saturday, March 10, Mr. Humphreys, coroner' held an inquest at Stepney, on the body of John Tickell, aged 61, who committed suicide by laudanum. The deceased, who was a master mariner, had been separated from his wife, and had become low and desponding, his wife refusing to return to him, in consequence of his intemperate habits. On the previous Tuesday, the deceased retired to rest as usual, and on the following morning his landlady found him lying in bed in a state of unconsciousness. Upon the table was found a bottle and a glass which had contained laudanum. Verdict—"Temporary insanity."

Suicide by Oil of Vitriol.—An inquiry was instituted at the London Hospital, by Mr. Humphreys, coroner, respecting the death of Thomas Maddeman, aged 60, who committed suicide, at No. 166, Wentworth Street, Whitechapel. The deceased was a pensioner, and lived very scantily upon his small income from Government. On Wednesday, March 14th, he was seen to leave his room, and he went out and purchased some oil of vitriol. He shortly afterwards returned and rushed into the house, exclaiming, "I have taken poison!" He was taken to the London Hospital, when he shortly afterwards expired. Verdict—"Temporary insanity."

THE CASE OF POISONING AT CANTERBURY.

Home Circuit, Maidstone.

(Before Mr. Justice Wightman.)

John Reeve surrendered to take his trial for the manslaughter of Thomas Benjamin Cob.

Mr. Deedes and Mr. Addison conducted the prosecution; the Hon. G. Denman was counsel for the prisoner.

A report of the evidence taken before the magistrates at Canterbury was published in the January Number of this Journal; but we give a short recapitulation of the facts of the case.

John Reeve, the prisoner, carried on the business of a chemist at Canterbury, and his brother, a youth of 17, acted as his assistant. The deceased was a young man, a tailor at Canterbury, and on the 19th of December he complained of a sick headache, and he went to the prisoner's shop and obtained a draught and some pills. On the following day he sent his sister to the prisoner's shop for some more medicine, and the prisoner handed her a phial, which was supposed to contain the ordinary black draught, and told her that her brother was to take it with the pills. The deceased took the draught as directed, and very shortly afterwards he became very ill, and a medical gentleman named Andrews was sent for, who, from the symptoms he exhibited, formed an opinion that he was suffering from epilepsy, and he prescribed some remedies, which had no effect, and the deceased died in a few hours afterwards. A coroner's inquest was held upon the body, when the jury, upon the evidence before them, returned a verdict "that the deceased died a natural death." The prisoner was present during the inquiry, and it was observed that he appeared very much distressed and excited, and when the proceedings had been brought to a conclusion, an inspector of the county constabulary addressed him, and said that he had now nothing to fear or be annoyed at, as the jury had returned a verdict of "Natural death." It appeared that on the same morning this officer had obtained from the prisoner's shop a draught of a similar kind to the one that had been taken by the deceased, and the prisoner appeared very anxious that the officer should restore it to him, and offered to give him a sovereign for it. The officer refused, and the prisoner, who appeared to be in a state of great alarm, said that he was afraid there was something wrong in the draught. The constable reported the matter to his superior officer, and the result of further inquiries that were made left very little doubt that a quantity of opium had been by mistake administered in the draught taken by the deceased.

Mr. Denman, in an eloquent speech, contended that neither of the two points urged by the prosecution had been made out—either that the deceased had died from the effects of poison, or that the accident occurred through criminal negligence.

The learned *Judge*, in summing up, stated that unless the accused was clearly proved to have been guilty of criminal neglect, the indictment could not be sustained. The prisoner was evidently a respectable young man; he had, by all accounts, conducted himself exceedingly well; and, as far as Mr. Andrews could say, was careful in his business. Now, they all knew this—that, despite the greatest diligence and attention, unfortunate accidents might happen, which hardly deserved to be classed within the list of what could be called reasonable cases of inattention or neglect. In the first instance, the jury must be satisfied, beyond all reasonable doubt, that the death of the deceased was caused by the black draught; and, secondly, that it was sold through criminal negligence. His lordship then proceeded to point out that no decisive evidence had been given under either of these heads, and to tell the jury, in conclusion, that unless they were reasonably assured of both, their verdict must be one of acquittal.

The Jury retired for about five minutes, and then returned a verdict of *Not Guilty*.

POISONING BY WHITE PRECIPITATE.

Home Circuit, Lewes.

(Before Lord Chief Justice Erle.)

Harriet Moore, aged 20, was charged with the wilful murder of her illegitimate child. A second indictment charged her with feloniously administering to the same child a quantity of a deadly poison called white precipitate, with intent to murder it. The prisoner pleaded "Guilty," but by the advice of the Lord Chief Justice, she afterwards pleaded "Not Guilty." Serjeant Ballantyne and the Hon. G. Denman conducted the prosecution, and Mr. Barrow consented to act on behalf of the prisoner. It appeared that the prisoner was admitted into the workhouse in November last, with the child in question. She was in a miserable and dirty condition, and was supplied with white precipitate mixed with lard, for the purpose of cleansing her head. The child was in good health until December 20, when the prisoner asked one of the paupers to buy her a pennyworth of white precipitate. She did so, and gave it (about twenty grains) to the prisoner, wrapped in a paper

labelled "Poison." In the course of the evening some arrowroot was administered to the child by the prisoner, and immediately afterwards the child was violently sick, and during the night shrieked as though in great pain. On the following morning the child was found to have undergone a remarkable change, and, in the language of one of the witnesses, had become quite an "old man." It lingered till about two o'clock, and then died.

A *post-mortem* examination was made by the medical officers of the Union, when the intestines were found greatly inflamed. The stomach and other parts of the body were forwarded for analysis to Dr. Taylor, who found white precipitate to the extent of two grains. Dr. Miller, of King's College Hospital, made an independent examination, and with a similar result.

Mr. Barrow, on behalf of the prisoner, said that after the medical evidence there could be no doubt that poison had been administered, but he contended the evidence was not conclusive against the prisoner.

The learned *Judge*, in summing up, said that the counsel for the prosecution, in the exercise of his discretion, had not thought it advisable to proceed with the charge of wilful murder; the question they had to decide was whether the evidence established beyond any reasonable doubt that the prisoner knowingly administered poison to the child with the intention of destroying life; and if so, they would be bound to find her guilty. The Jury returned a verdict of "Guilty."

The learned Judge, addressing her, said that she stood convicted upon perfectly clear evidence of a crime of the most aggravated character. He had no desire to add to the misery she was enduring at that moment, and he should say no more than that he did not intend the law should take its course, and that he considered justice would be satisfied by his merely ordering judgment of death to be recorded against her.

A verdict of "Not Guilty" was then taken upon the charge of wilful murder, and the prisoner was removed from the bar.

FOREIGN QUININE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—As one of the representatives of foreign quinine manufacturers, we have noticed with much concern the article in your Journal of the 1st inst., referring to Foreign Quinine, and containing a warning to the British public regarding short weight, &c., discovered by the writer in some ounce phials.

We deeply regret he did not particularize the manufacture to which he referred, and the parcels of which he obtained his samples, as we cannot but feel that his statement, from its general character, throws a slur upon the whole foreign quinine trade, and is thus calculated to do serious injury to manufacturers of standing and respectability, besides depriving the manufacturer, to whose samples these discoveries refer, of a fair chance of clearing himself of the serious charge, especially coming as it does with but indifferent grace at a time when this branch of business is thrown open to fair competition by the removal of the unjust and oppressive duty to which the article has hitherto been subject.

We feel sure you would regret that your Journal should have been made the medium to assist in damaging the whole trade in this article, the nature of which requiring especial confidence in manufacturers, and that it should in consequence suffer from the discoveries your informant says he has made, and we therefore think he ought, in fairness, to give the name of the manufacturer to whom he alludes, and also to state whether the samples examined came direct from the same into this market, as otherwise the innocent will be made to suffer for the guilty, or for any discrepancies that may have happened in an individual case, and for which the manufacturer could hardly be made responsible, if his mark otherwise bears the character of respectability.

We will only add, that for upwards of a quarter of a century a comparatively extensive trade in foreign quinine has been carried on at intervals in this country, and that we have never heard of any complaint having been made of irregularities in the weight or contents of the phials from respectable manufacturers, or of any detriment which the value of foreign quinine thereby suffered, and which otherwise our wholesale druggists and dispensing chemists would not have passed over so readily.

Begging the favour of your inserting the above in your next number, we remain, Sir, your obedient servants,

F. W. Roller & Co.

3, *Love Lane, Eastcheap, London,* 14*th March*, 1860.

ALLEGED ADULTERATION OF PEPPER.

Messrs. Wright, Crossley, and Co., spice and seed merchants, 17, North John Street, Liverpool, appeared at the police court, March 16, before Mr. T. S. Raffles, the stipendiary, and Mr. A. Castellain, upon a charge preferred by the officers of inland revenue of adulterating pepper. Mr. Tyndall conducted the case for the prosecution, and Mr. Aspinall, instructed by Messrs. Woodburn and J. Pemberton, appeared on behalf of the defendants. The cause excited very considerable interest.

Mr. Tyndall, in opening the case, said the information upon which the defendants appeared, charged them with being in possession of a quantity of pepper adulterated with the husks of mustard-seed. He had no doubt his friend Mr. Aspinall would endeavour to make the best he could of the case of his client. The defence would, no doubt, be that the adulteration was quite casual; that the defendants ground pepper and mustard and other seeds, and so it was probable the husks of the mustard had got mixed with the pepper. When he (Mr. Tyndall) stated that the effect of mixing the husks of the mustard-seed with ground pepper was to improve the appearance of a deteriorated article, he had no doubt their worships would agree with him that the adulteration had taken place for that object, and had not been accidental. The defendants ground their pepper with large millstones, which enabled them to reduce it to a much finer powder, and thus rendered the detection of adulteration still more difficult, the only satisfactory mode of detection being by the use of the microscope. In the present case suspicion having been directed against the defendants, samples of their pepper were taken by the officers of excise, and, on examination, were declared to be adulterated by mustard husks. The information was laid under the 59th Geo. III., chap. 53, sec. 22. The following witnesses were then called:—

George Bonton deposed that he was a supervisor in excise. Witness visited the premises of the defendants on the 13th of January last, when he saw the manager and Mr. Crossley. Examined 290 lbs. of pepper in three different quantities, and a sample was taken of each. The defendant knew witness was an officer of excise. There were black and white peppers, and samples were taken of each. Mr. Weir, the chemical officer, accompanied witness, and they divided each parcel of pepper into three samples, two of each being sent to London, under seal, which was placed upon them at the Custom-house on the next day.

Mr. John Weir deposed that he was a chemist in the excise at Liverpool, and had acted in that capacity for the last five years, during which he had had considerable experience in the examination of adulterated articles, and he saw at once that the pepper in question was adulterated. The samples did not go out of the hands of witness, and he divided each into two portions, sending one to London, and retaining the other. On examination he discovered the adulteration to consist of mustard husks and cereal starch. In cross-examination, witness stated that he had been in the employ of the inland revenue since 1845 ; had studied chemistry two years at University College, London, when his expenses were paid by Government. There were three casks of pepper, two of black and one of white, all of which were adulterated. He examined each sample taken from the bulk thirty or forty times, and discovered mustard husk to the extent of from five to eight per cent. He could not discover the cereal starch without the microscope ; the quantity he discovered was about one per cent. In the white pepper he detected white mustard, and in the black pepper both red and white mustard.

Robert Williamson deposed that he was assistant chemist to the Board of Inland Revenue in London. He had been employed as a chemist two years, and had been educated as such. He had examined a great number of samples of pepper, including those which were submitted to him in January last by the last witnesses. He found that the samples of black pepper contained a mixture of red and white mustard-seed to the extent of five per cent., and one per cent. of cereal starch; and the white contained eight per cent. of white mustard-seed. He could very easily detect the mustard-seed from the pepper; there was no similarity between the two.

Cross-examined: Had been seven years in the employ of the excise; his first duty was that of an ordinary excise officer, and he was then selected by the board for

chemical instruction at University College. In the samples in question which were submitted to him he also discovered a long pepper, known to grocers as pickling spice; but there was no capsicum, though at first he supposed there was. What he thought was capsicum he subsequently discovered to be long pepper. He knew nothing of the price, and could not say whether long pepper or round pepper cost the most. He found that large grinders generally mixed the long pepper with the other, but those who only had small mills seldom or never mixed them.

William H. Johnstone deposed that he was a supervisor in the excise, having been fifteen years in that employ. Had had some experience in the examination of pepper, and he had examined the samples taken from the bulk seized from the defendants. He also discovered red and white mustard husks and traces of starch other than the starch of pepper. He was not aware that mustard husks could be turned to any legitimate use.

This closed the evidence for the prosecution.

Mr. Raffles said he perceived there was a very stringent clause before the House of Commons on the previous night, evidently intended for the protection of the seller, showing that the legislature—and he thought very properly—were of opinion that care should be taken of the seller as well as the buyer.

Mr. Aspinall then proceeded to address the court on behalf of the defendants, saying his defence was not that which had been suggested. It was not in the slightest degree that there was any adulteration whatever, either by accident or in any other way. He did not for a moment seek to escape from the dilemma in which it was sought to place the defendants, for he agreed that it would be an offence of the greatest possible heinousness, aggravated by the respectable position of the defendants. He could not help complaining that the representatives of the Crown had not thought it necessary to call in any really reliable professional assistance in order to give the court information on the subject. He proposed to call, not one, but a series of witnesses, to whom everything had been submitted in the most open and candid manner. He intended to call Dr. Inman, Mr. Huson, and Mr. Laurence Hardman, all of them gentlemen of the greatest proficiency and skill, and they had examined various samples of the pepper in question, amongst them samples which had been given to them from the bulk still retained by the excise. They would tell the court that they had done all that men possibly could do with the view of detecting whether or not the pepper was adulterated, and they would give the result of their examinations.

He then called

Mr. George Huson, who deposed that he was an analytical chemist, residing in Liverpool, and had been in that profession between seventeen and eighteen years, during which time he had had great experience in analyzing substances for commercial purposes. Had examined samples of pepper furnished to him by Messrs. Wright, Crossley, and Co., and he reported to them that after the most rigid scrutiny with the microscope, he had been unable to detect any substance foreign to the pepper itself. After other examinations, he reported that he had perfectly satisfied himself of the genuine character of the pepper. Having obtained samples from the bulk lying at the Custom House, he examined them, and reported that they were identical with those which had been supplied by the defendants, and with three other samples known to be pure, having been ground by himself. In the samples which he produced then, he had not been able to discover any mustard husk. Had seldom been engaged to examine samples of pepper.

Cross-examined: He was not acquainted with the structure of the mustard or pepper-seeds; but had mixed mustard husk with genuine pepper for the sake of comparison, and there was no mistaking its presence. He thought it would be impossible for a gentleman accustomed to examine peppers to discover the presence of mustard husk with the naked eye. (Having mixed a parcel in the court, however, and examined it, he afterwards said he believed he could distinguish the mustard husk.)

At this stage of the proceedings, Mr. Tyndall suggested that the magistrates should examine with the aid of a microscope the sample which had just been mixed by the witness, and then a sample of the bulk seized by the excise.

The court declined.

Dr. Inman was next called, and he deposed that he had examined samples of the pepper, after which he reported that they were not adulterated by mustard husk or any farina. Upon a close examination, with the view of ascertaining upon what ground it had been presumed that the pepper had been mixed with mustard husk, he found a quantity of yellow grains similar to those which had been previously pro-

duced as mustard husks, and those he found to consist of the inner rind of the peppercorn. The farina which he discovered was the farina of the pepper.

Mr. Laurence Hardman was about to give the result of similar examinations which had been made by him, when

Mr. Raffles said Mr. Castellain and he quite agreed that there was no evidence to uphold the case, and there was therefore no necessity for Mr. Aspinall to carry the evidence for the defence further. He intended no disparagement to the gentlemen who had been called on the part of the Crown, but he thought gentlemen of greater professional experience ought to have been called to meet the evidence of Dr. Inman and others who had been called for the defence. He thought it a very unsatisfactory tribunal for such a case.

A number of other cases of a similar nature against retail dealers were adjourned to Monday, with the understanding that they would then be further adjourned till after the assizes, Mr. Tyndall intimating that after the decision of the magistrates he should not consider it his duty to proceed with them without further instructions from the authorities in London.

TO CORRESPONDENTS.

Chlorine in Nitrate of Bismuth.—We have received a communication from Mr. Robert Howard, referring to the presence of chlorine in some samples of commercial nitrate of bismuth, and the duties of the Pharmaceutical Society in reference to this and other cases of the sophistication of drugs, which subject we intend to notice in a future number.

Sending Lucifer Matches by Railway.—A summons was issued by the officers of the South Western Railway Company against Mr. James K. Hardy, of 28, St. John Street, Clerkenwell, for sending, on the 28th of February, a quantity of lucifer matches to be conveyed by that railway to Poole, in Dorsetshire, without distinctly marking the packages containing the same, or giving any notice of the contents. The defendant was fined forty shillings and costs.

Anonymous.—In preparing the mixture alluded to, the use of a mortar is not necessary; by rubbing down the ingredients the colour of the mixture would probably be darker, in consequence of the action of the alkali in a more concentrated state on the vegetable matter in the syrup and tincture.

C. H.—Membership can only be obtained by examination. For particulars apply to the Secretary, 17, Bloomsbury Square.

M. B. (Manchester).—The label in question is not liable to medicine stamp duty.

G. H. W. (Sheffield).—*German Yeast.* Vol. xvii., page 600.

T. W. S. (Westbury).—The preparation for boot-tops referred to, containing arsenic, could not be sold without incurring the penalty under the "Sale of Arsenic Act."

Justitia (C.E.)—The motive in the transaction alluded to could be no other than a desire to do business at a small profit.

R. B. (Glasgow.)—(1.) Vol. vii., page 183. (2.) Vol. xv., page 144.

J.—Carbonate of lithia is given as a remedy in gout. The theory of its action is that it forms a soluble compound with the uric acid.

S. A. W. (Manchester).—The labels referred to are liable to the medicine stamp duty.

H. E. T. (Liverpool).—*Marking Ink.* Vol. vii., page 183.

A Registered Apprentice (Sheffield).—Lindley's *Glossary of Botanical Terms.* Price 5*s.* Bradbury and Evans. Lindley's *School Botany*, and Hooker and Arnott's *British Flora*, are all the books that you require at present.

E. P. H.—(1.) The Collections for the Prize Herbarium must consist of wild plants only. (2.) The Silver Medallist of one year is not allowed to compete in a future year. (3.) For further particulars relating to the competition for the Prize Herbaria, our correspondent is referred to the present number of the Journal.

"*Ambition*" (Manchester) will find in the present number of the Journal full particulars respecting the competition for the Botanical Prize Herbaria. The presence of the successful candidates at the prize distribution is not absolutely necessary, although very desirable.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. XI.—MAY 1st, 1860.

THE COLLEGE OF PHYSICIANS AND GENERAL PRACTITIONERS.

A RECENT decision of the College of Physicians of London is calculated to produce a very important influence upon the most numerous class of medical men, the general practitioners, throughout the country; and we believe also, indirectly, upon the practice of pharmacy as a distinct profession. At a meeting of the Fellows of the College of Physicians, held on Wednesday, the 18th of April, it was decided to create a third class of medical men connected with the College, who, in regard to the nature of their practice, will occupy a similar position to that of the apothecary or general practitioner, with a restriction as to dispensing medicines only to their own patients. The probable effect of this arrangement will be gradually to divert the applications for licences to practise medicine from the Apothecaries' Hall to the College of Physicians. It cannot be doubted that when the doors of the College of Physicians, the highest medical body, are thrown open to a class of general practitioners, by establishing an examination and conferring powers equivalent to those of the present apothecaries, the new medical licence which it is proposed to grant, with the designation of Licentiate of the College of Physicians, will be sought after in preference to the apothecaries' licence. The medical profession will thus be gradually restored to its proper condition, and one of the principal sources of dissension and weakness, arising from a clashing of interests between two bodies having similar objects, will be removed. Already the College of Physicians had raised the previously existing Licentiates of the College to the position of Members, so that the two existing grades are those of Fellows and Members, who alone will be recognized as Physicians, and who are restricted from the dispensing of medicines. The Licentiates to be admitted under the new regulation will not be entitled to the appellation of Doctor; they will be general practitioners holding a licence from the College of Physicians, and having the power to dispense their own medicines, but not, in any other way to engage in the sale of drugs. The College of Physicians will thus represent the practice of medicine in its widest range, while surgery and pharmacy, although not excluded from the province of the physician, will form distinct branches of study and practice. The wants of the public will be supplied as heretofore. There will be then, as now, physicians, surgeons, general practitioners, and pharmaceutists, but the physicians and general practitioners will belong to the same College, differing only in the extent of their qualifications, and in the fact that those with the lower qualification will be allowed to dispense the medicines they prescribe.

It may be asked, how will this arrangement be likely to affect the practice of pharmacy as a distinct profession? We think it will do so by giving to the general practitioner (the proposed Licentiate of the College of Physicians) a higher professional position than he occupies as an apothecary; for, although the licentiate will be distinguished from those members of his college who will rank above him by the power to exercise pharmacy in connexion with the practice of medicine, the new regulation will no doubt tend to induce a greater separation, than at present exists, of the practice of pharmacy from the prescrib-

ing of medicines. There has been a tendency in this direction for many years past, and every improvement which has been effected in the qualification and position of the general practitioners, for which so much credit is due to the apothecaries, has contributed to promote such a separation. A more rapid and extensive change, however, may be looked for under the proposed arrangement, and members of the pharmaceutical body will do well to consider how far they are fulfilling all that may be required of them in anticipation of the change.

There are two questions especially which will press upon pharmaceutists in connexion with this subject.

In the first place, the pharmaceutical body will have to consider how far the qualification of their members will meet the requirements of the altered circumstances which a few years may present. Pharmacy is now, to some extent, represented in this country by the apothecaries, and although the Pharmaceutical Society have assumed a position in which they are looked to as the body that ought to represent pharmacy, just as the College of Surgeons represents surgery, yet it is only by raising the standard of professional education, and maintaining a high qualification among the members, that they will be able to command such a general concession to their claims as to ensure to them the undisputed possession of the honourable position they may desire to occupy.

It is also of very considerable importance to pharmaceutists to consider whether they are confining themselves as far as is practicable to the exercise of those duties which properly belong to them, and for which their professional education has fitted them. While medical practitioners are more generally withdrawing from the practice of pharmacy, and leaving the dispensing of medicines to those who make it their special business, the pharmaceutists should manifest a desire on their part to interfere as little as possible with duties which properly belong only to those who have received a medical education.

These questions cannot be too strongly urged upon the attention of those who desire to see Pharmacy raised to its proper level in this country, and its followers occupying the position generally accorded to those of the same profession abroad. The means which have been adopted by the pharmaceutical Society for promoting the cultivation of scientific knowledge among its members are beginning to produce their legitimate fruits, and duties are now referred to members of this Society with which no mere Pharmaceutists in this country would have been entrusted previously to the establishment of the Society. But, although much has been accomplished, much still remains to be done; and the disposition which is so clearly manifested among the leading members of the medical profession to throw increased responsibilities upon the members of our body, should act as a stimulus to renewed and more energetic exertions in carrying out the objects for which we have been long working.

EXAMINATION OF DENTISTS BY THE ROYAL COLLEGE OF SURGEONS.

The regulations adopted by the College of Surgeons for granting certificates upon examination to men qualified to practice as Dentists, which will be found at page 579, are deserving attention, as they are calculated to produce an important change in the position of those who take up this branch of surgical practice, and as affording an indication of a growing disposition to require evidence of qualification for the exercise of responsible duties in connexion with the practice of medicine.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *4th April*, 1860,

Present—Messrs. Bird, Bucklee, Cupiss, George Edwards, Hanbury, Haselden, Hollier, Lescher, Meggeson, Morson, Sandford, Squire, and Waugh, the following was elected a

MEMBER.

STOWMARKET .....Charles William Sutton.

SPECIAL MEETING OF THE COUNCIL, *16th April*, 1860,

Present—Messrs. Deane, Hanbury, Lescher, Morson, Sandford, Squire, Bird, and Waugh.

The preliminary arrangements for constructing a Laboratory on the top of the premises were completed, and a tender for the work accepted.

MAJOR EXAMINATION, *17th April.*

Bennett, George.....Blandford
Blackman, Thomas .....Woolwich
Jones, Charles William.....Carmarthen
Moon, William Henry .....Ilfracombe
Norrish, James .....Crediton
Orton, Thomas Johnson .....Nuneaton
Pertwee, Frederick .....London

MINOR EXAMINATION.

Bell, William Henry.....Whitehaven
Christian, John Osborne .....Douglas
Kent, Frederick William ....Southampton
Marriott, Frederick T. .....Rugby
Poll, William Sheppard .....Bungay
Walsh, Edward .....Maidstone

REGISTERED APPRENTICES.

NAME.	RESIDING WITH.	ADDRESS.
Browne, Thomas L.	Mr. Higgins	Chester
Edwards, William	Mr. Horton	Much Wenlock
Hamilton, Herbert B.	Mr. Savage	Brighton
Jelly, Stephen J.	Mr. Simpson	Hull
Jones, Hugh	Mr. Bancroft	Ruthin
Judson, Charles W.	Mr. Judson	Ripon
Norrish, Henry	Mr. Jackson	Crediton
Richardson, Joseph H.	Messrs. Balkwill & Sons	Plymouth
Rider, Frederick	Mr. Tippett	London
Walker, William W.	Mr. Evans	Swansea
Warren, George Robert	Mr. Harris	Ware

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued*).

Amount previously advertised, £1752 17*s.* 0*d.*

	£	s.	d.
Baxter, Wm. W., Bromley	1	1	0
Beach, Thos., Bridport	1	0	0
Blackburn, Bailey, Bradford	1	1	0
Davies, Wm. G., Shrewsbury	0	10	6
Ellis, Geo. H., 4, Pavement, Finsbury	1	1	0
Fitt, Edward, Barking	1	0	0
Harrison, Thomas, Bradford	1	1	0
Hayward, Wm. G., Reading	0	10	6
Hazell, Robert W., Maidstone	1	1	0
Hooper, Hugh H., Brixton	1	1	0
Large, John H., New North Road	1	1	0

	£	s.	d.
Manby, Charles, F.R.S., 25, Great George Street	1	1	0
Overbury, Henry, Alcester.....	0	10	0
Parkinson, Robert, Bradford	1	1	0
Ralfs, Henry S., Brentford	0	5	0
Willan, James R., Wolverhampton	1	1	0
Wilson, Thomas, Bradford	1	1	0
Wilson, Thomas, Upper Holloway	1	1	0

PHARMACEUTICAL MEETING.

Wednesday, April 4th, 1860.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The following

DONATIONS TO THE LIBRARY AND MUSEUM

were announced :—

Chemical News. From the Editor.
Photographic Journal. From the Photographic Society.
Journal of Dental Science. From the Publisher.
Journal of the Chemical Society. From the Society.
Rhizomes of *Sanguinaria Canadensis.* From Dr. Gibb.
Pareira brava root. From Mr. Squire.
Various fruits and seeds. From Mr. Baigent.
Specimen of *Inulin* from Taraxacum Root. From Mr. Groves.

The following papers were read :—

SOME FURTHER REMARKS ON THE ECONOMICAL AND MEDICAL USES OF THE OIL COMMONLY CALLED CROUPEE ON THE GOLD COAST, TOULOUCOUNA AT THE GAMBIA AND SENEGAL, AND KUNDAH AT SIERRA LEONE.

BY ROBERT CLARKE, ESQ., COLONIAL SURGEON, GOLD COAST.

The tree which produces the seeds from which Croupee oil is made is a Meliaceous plant, the *Carapa Touloucouna* of the *Flore de Senegambia.** It flowers in January and the early part of February, and ripens in March or April, when the fruit is gathered, and shortly after the manufacture of the oil is commenced. The fruit, a large, somewhat globular five-celled capsule, contains in each cell eighteen to thirty seeds, varying in size from a chestnut to a small hen's egg. They are three-cornered, convex on the dorsal surface, of a brownish or blackish red colour, and rugous. On the Gold Coast the tree grows abundantly in Assin, Tueful, Dinkarra, and Western Wassaw, the Braff Country, Essicoomah, Akim, and Aquapim, and in several of the other districts of the protected territory. Strictly speaking, it might be extensively grown over large tracts of land, both at Sierra Leone and the Gold Coast, which are at present a wilderness of jungle ; the land under cultivation bearing so small a proportion to that lying waste, and which prevails to such an extent, that the former is the exception and the latter the rule. In the vicinity of Freetown, and the villages and hamlets of the former colony, and in the suburbs of Cape Coast, and forts on the seaboard of the latter settlements, nearly all the magnificent forest trees have been cleared away, the ground being covered with copsewood, densely matted by climbing plants. Everywhere almost in these luxuriant copsewoods the Carapa forms part of them, and is readily distinguished by the rich reddish-brown colour of the bunch of soft leaves which adorn the points of the upper branches, attracting the notice of the most casual observer by the beautifully variegated appearance imparted to the darker leaved brushwood around them. Its presence also is a sure indication of the fertility of the soil on which it grows.

* In my former paper on Touloucouna oil, which appeared in vol. ii., page 341, of the *Pharmaceutical Journal*, the carapa tree, it was stated, would be found figured in Sweet's *British Flower Garden ;* but this is not the case, as I had an opportunity of ascertaining through the kindness of Mr. Bennett, of the Botanical Department, British Museum.—R. C.

At present, Cape Coast market is chiefly supplied with Croupee oil from Assin, Accra obtaining its supplies from Akim, and Aquapim. Small quantities are brought to Wimebah from Essicoomah, the other regions before named furnishing enough of it for home use.

The manufacture of Croupee oil is conducted by the natives much in the same way as they make palm oil. In Assin the seeds are dried for a short time, they are then boiled, and the oil skimmed off as it rises to the surface. The boiling is done in large clay pots made in the country, which are ingeniously ranged upon furnaces built of clay; large quantities of the seeds being boiled in them with little trouble and small expense, fuel being abundantly at hand in the rural districts of the country, which is not the case in some of the Coast towns, where it is scarce and extremely high priced. For domestic use and for sale the natives preserve the oil in large wooden troughs hewn out of a part of the trunk of the Pullom or wild cotton tree. They fit these reservoirs with covers of the same material, and thus keep the oil safe from impurities falling into it.

In the village of Kent, situated in the western district of the colony of Sierra Leone, the mode of obtaining Croupee, there known as Kundah oil, is somewhat different. There the seeds, after being sun-dried, are hung up in wicker hurdles for some weeks in their huts, and exposed to the heat and smoke from the fire, are subsequently slightly roasted, and reduced to a pulp in large wooden mortars, which is boiled, the supernatant oil being removed by skimming.

The economical uses of Croupee oil are varied. It burns well, and the finer qualities give a pleasant and good light, but more frequently the bulk of it brought to market burns rather smokily; but that defect might, in my opinion, be removed, by greater care being taken in preparing the oil, the present methods being rude and imperfect. As a paint oil it answers well and admirably for lubricating iron tools and utensils, and I am satisfied will be found a valuable addition to the oils used in the manufacture of soap.

Croupee oil is taken to market in pots, holding from two to four gallons each, the average market value paid by the traders in Manchester or Birmingham goods being about 1*s.* 9*d.* sterling a gallon on the Gold Coast. At Sierra Leone it is carried to market in calabashes, the average market price being about 2*s.* per gallon. As an article of commerce it is alleged to be deficient in stearine, but I am not aware whether this statement is correct. It should, however, be kept in view that there is almost invariably the greatest difficulty at first experienced in attempting to introduce any new product to market. Few of the regular purchasers will buy it, as they want that kind of oil to which they have been accustomed either for machinery or manufacture, and it is only by sending it for years to market that it at length attracts attention. Gradually, however, it works its way up, and being found useful, inquiries are made for it and its real value determined. Much labour and time might be saved, and the process shortened, by employing brokers who pay special attention to particular articles, and by giving them every information on the subject. This method, I would suggest, should be tried with Croupee oil, and I feel satisfied would be ultimately rewarded by its becoming a valuable export from the Gold Coast, more particularly when it is known that a very large quantity could be procured, and double or treble that quantity if encouragement is given to the growers; and there is good reason for believing that these expectations are capable of being practically realized, and a vast benefit thereby conferred on the settlements of the Gold Coast. For some years past several puncheons of the oil have been shipped from Cape Coast to the United States, by an enterprising merchant there, the samples sent fetching the current price of palm-oil; and I may here mention that it is generally used in the Wesleyan chapels on the Gold Coast for lighting purposes, and is found to answer well.

Several years ago I brought from Sierra Leone to England specimens of the root, stem, leaves, and fruit of the Touloucouna tree, with the oil, and these

were at the time deposited in the Museum of the Pharmaceutical Society, where, doubtless, they have been carefully preserved. Before, however, leaving the Gold Coast, I supplied myself with some of the oil from Assin, a sample of which accompanies this paper. An analysis of the oil I took from Sierra Leone in 1842 was made by Mr. Redwood, which showed that it is entirely soluble in ether. In alcohol it is separable into two parts, a concrete substance which was dissolved, and an oil fluid at ordinary temperatures, on which the alcohol has no effect. The former contained the bitter principle and the nauseous odour of the oil, the latter being nearly colourless and tasteless. According to MM. Pelroz and Robinet, the oil owes its bitterness to an alkaloid principle, which is also found in the bark of the tree.

The natives of the Gold Coast, and some of the mixed races at Sierra Leone, with the Soosoos, Timmanees, and Sherbros, inhabiting the country in the neighbourhood of the latter colony, greatly value Touloucouna oil for its anthelmintic virtues, as they, and indeed all ranks and classes of people living in West Africa, are apt to become infested with one or other of the Tœnia, or with lumbricus, suffering more especially from the former varieties of worm. Some of the negroes use it as a rubefacient to relieve rheumatic and fugitive pains, and they freely apply it to cure the inveterate itch, known on the Coast by the term Kra-Kra, and also in other skin diseases to which they are very liable.

Having heard a good deal of its effects as an anthelmintic, I was induced to give it a fair trial, which I had ample opportunity of doing, as I was then in charge of the large Liberated African hospitals at Sierra Leone. In the numerous cases I tried it I can speak favourably, as I found it to expel and destroy both varieties of tape and also lumbrici. I must, however, candidly admit that its nauseous and extremely bitter taste, in my opinion, will prevent its more general employment, unless it may turn out that its valuable and undoubtedly powerful anthelmintic properties depend upon (as in all probability they do) the bitter alkaloid principle, which could, no doubt, by careful manipulation, be freed of its nauseous odour. At least it is well worth a patient trial to ascertain whether so desirable an object cannot be accomplished, because I feel satisfied it would be found a remedy of no mean importance, from the fact of the negroes being accurate observers in matters relating to their own comfort and happiness.

I was in the habit of giving the oil internally in doses of one or two ounces, but this, of course, was regulated by the age and strength of the patient. In weakly persons I consider its administration unwarrantable, while it may safely be given to the robust. Its action as a purgative resembled castor oil, both in the length of time it takes to operate and in the bulky nature of the evacuations. Over doses induce the most dangerous consequences, as hypercatharsis, vomiting, cold sweats, and death, if relief was not soon obtained.

Should the patient labour under ascarides, it may be used as an enema, and with the greatest benefit. An ounce or two of the oil may be dissolved in a pint of warm water and thrown into the bowels, and will be found to dislodge and bring away great numbers of these parasites.

London, 28th February, 1860.

Mr. Daniel Hanbury said he had seen specimens of the seeds which were imported some time ago, and also the oil and the mark left after pressing the oil. The mark was extremely bitter, and would probably be the best source from which to obtain the bitter principle which had been referred to.

Professor Bentley remarked, that the oil now exhibited closely resembled that obtained in Guiana from *Carapa guianensis*, and a specimen of which, under the name of Crab Oil, was forwarded to this country, and shown at the Great Exhibition in 1851. This oil had been used for burning, and was recommended as a valuable external application in certain cutaneous diseases. It might be a question, however, whether *Carapa guianensis* and *C. guineensis* were distinct species?

PREPARATIONS OF TARAXACUM.

BY MR. THOS. B. GROVES.

[This paper was written some months ago, before the subject had been announced for treatment by Mr. Hills, or so ably commented upon by Professor Bentley; but was laid aside, under the impression that the subject had been sufficiently ventilated. It is now submitted to the meeting at the suggestion of some of the members, who consider that some of the points referred to will admit of further discussion.]

The dandelion plant is so well known and everywhere abundant, that it will be unnecessary to describe it here, nor need I repeat what is to be found in every Manual of Materia Medica, respecting the comparative value of its roots at various seasons of the year; suffice it that I have collected and prepared them at all seasons, and hold, that all things considered, October is the best month for treating them. The P.L. extract of dandelion is directed to be prepared from the root by macerating for twenty-four hours 2½ pounds of it bruised in two gallons of boiling distilled water, boiling the mixture to one gallon, straining while hot, and lastly, evaporating to a pilular consistence. The product I have obtained by this mode of procedure bears no similarity to any extract I have met with in commerce, and were it used without explanation would mortally offend nine of ten patients accustomed to the ordinary preparations.

I have found it to be an opaque mawkish mass, tenacious but not gummy, of saltish taste, but possessing little sweetness, and forming, when rubbed up with water, a whitish opaque fluid, as, I believe, very imperfectly representing the active principle of the root. The commercial extract, on the other hand, is of a more or less dark brown colour, sweet in taste, with slight bitterness, tenacious and gummy, and forms, when diluted with water, a semi-transparent liquid. I here refer to extract sold as having been prepared according to the P.L. There are other extracts of a more pretentious kind, said to be obtained by evaporating the filtered expressed juice of the root, which are less sweet and transparent, but yet are very different from that I have been accustomed to obtain from the mere evaporation of the fresh expressed juice. This latter plan is that ordered by the U. S. Pharmacopœia. Pereira states of the P.L. extract, "that it should be brownish, not blackish. Its taste is bitter and aromatic; that of the shops is usually more or less sweet. It should be completely soluble in water." If by water is here meant cold water, the description is incorrect, according to my experience; though true if hot is intended; the fact of solubility then indicating that the liquor, previous to evaporation, had been properly strained from the inert tissue of the root and suspended albumen.

A reference to the published analyses of the root will enable us to account for the great differences observed in its preparation, and perhaps point out better modes of procedure. Royle, however, does not throw much light upon it. He says the juice contains sugar, gum, albumen, gluten, an odorous principle, extractive, and its peculiar bitter principle. This is not strictly true, or, at least, not the whole truth respecting either the milky juice, as observed to issue from the transversely-sliced root, or that obtained by pressing the bruised root.

Pereira goes into greater detail. The analysis of Frickhinger, which he quotes, gives as the constituents of the expressed juice, or the extract prepared with cold water, albumen, mannite, extractive, mucilage, sugar, and salts; while that prepared by *boiling* the root in water contains, in addition, *inulin*. It is to the presence, absence, or modification of this last into gum or sugar, that the differences I have alluded to are attributable, and when I add that the expressed juice also contains inulin, as I have ascertained, though in a less proportion than the decoction, the same cause of difference operates also with the cold preparations, both of extract and liquor. As I before have stated, I

usually operate on dandelion roots in October. I then find the roots, if the season has not been a very dry one, yield about half their weight of liquor, light brown in colour, bitter, and more or less turbid—milky would scarcely be the right expression. This, when heated to coagulate albumen, I have strained and evaporated to a syrupy consistence, and then observed that a considerable quantity of matter had separated from solution. I have then strained, but found the same result shortly to re-occur, and, finally, that on allowing the again filtered extract to cool, it solidified to an opaque mass, of a somewhat gelatinous character, occasioned by the deposit of granules of inulin. It was therefore evident that these repeated filtrations were of no utility, as there would be no end to them, and accordingly the juice was evaporated after one straining only. I will here direct your attention to a mode of preserving extracts I have found very efficient in the case of extracts prone to mouldiness. I place such in covered pots, sprinkle the surface of the extract with spirit, and then hermetically seal them, by closely applying by the aid of heat a strip of adhesive plaster. Bladder, if sound, would have the same effect, but is liable to be perforated by insects; plaster is not.

The extract I should prefer would be that obtained by directly evaporating the expressed juice of roots gathered in October, after separating the albumen. It is of the utmost importance as regards uniformity, that a certain time should be specified for its preparation, and strictly adhered to. Much as the extracts prepared by different establishments differ among themselves, the liquors differ still more, and not unfrequently explanations have to be tendered as to why the medicine sent by you is so different in taste and appearance from that obtained elsewhere. Now, men conscientiously endeavouring to do their best, ought not to be laid open to these annoyances, from which the publication of an authorized formula would relieve them. The forthcoming Pharmacopœia will doubtless afford a remedy. I make the passing remark, the truth of which most present can certify to, that patients, as an almost invariable rule, firmly believe that the *first* time their medicine was dispensed it was dispensed correctly, and that any divergence from it marks an error: of the groundlessness of which opinion it is very difficult for one not backed by an "historic name" to convince them. Hence the necessity for authorized formulæ, and what is of at least equal importance, *sticking to them*, which all who regard their brethren's comfort should do, the comparative impunity of historic names notwithstanding.

There are three main ways of preparing the liquor: 1st, by adding rectified spirit to the expressed juice, without any previous preparation; 2nd, by evaporating the juice to a certain extent and then adding the spirit; 3rd, by redissolving the extract and adding rectified spirit to the solution. All these varieties may be obtained either bright or unfiltered from that the spirit has precipitated. A fourth kind is occasionally met with, prepared by percolating the dried root. It is the fashion to speak of the first and second when sold without previous filtration, as the "preserved milky juice of the fresh plant," &c. To this I myself must in candour plead guilty, but the expression is likely to mislead. If it be supposed that this whitish flocculent liquid is at all similar to the milky juice that exudes spontaneously from the transversely cut root, nothing can be more erroneous. In the first place, it is not milky in the strict sense of the term, and secondly, it does not half so well represent the medicinal virtues of the plant. Pereira quotes the analysis by John of this milky juice, and finds caoutchouc, bitter matter, &c. It is, of course, to the former it owes its milkiness, to the latter its comparatively powerful medicinal effect. I have not found anywhere the proportion of caoutchouc, but should myself estimate it at not less than 25 per cent. of the dried, or on the average, 8 per cent. of the fresh juice—a very considerable proportion. I have on more than one occasion found small lumps of nearly pure caoutchouc adhering to roots that had burst by lying in water a few hours. It will perhaps suggest to some individual to collect sufficient for a

fair trial of its medical virtues when exhibited in pills. I have examined the expressed juice, and the sediment produced in it by rectified spirit. I find a portion of this sediment to be inulin, the remainder albumen, gum, &c.; in fact, matters of no value whatever. I will finally suggest a formula for the future preparation of a standard liquor—that prepared from the extract I dismiss at once. Collect the roots in the latter part of September or beginning of October; clean and thoroughly bruise them without unnecessary delay (though a few days lying in the dirt, as when taken from the ground, does not hurt them); express the juice, and should it not equal in weight the mark left in the press, add the quantity of water requisite for making up the amount, and after two hours again express (this is to compensate for dry seasons, and thus conduce to uniformity); evaporate the juice to one-half, and when cold add to it one-fourth its volume of rectified spirit. Finally filter, and cautiously express the residuum. I have tried less proportions of rectified spirit, but one-fourth has appeared to me to be the least that will effectually preserve it. I take the liberty of offering the Museum a specimen of inulin I have lately extracted from the taraxacum root, of which I believe the Museum is at present deficient. It was prepared from the root after the expression of the juice, as to have prepared it from the juice itself would have involved an unnecessary waste of material.

Professor Bentley said that he had already stated his opinion so fully upon the subject of taraxacum root at a recent meeting of the Society, that he did not consider it necessary to enter upon the subject more in detail at present. He was, however, decidedly of opinion that the best time for making the preparations of taraxacum was the early spring. Another circumstance in favour of the use of the spring extract was its complete solubility in cold water as well as in hot water, which was not the case with the autumn-prepared extract.

SOME SUGGESTIONS RELATIVE TO THE PLASTERS OF OPIUM AND BELLADONNA.

BY MR. A. F. HASELDEN.

The subject of plasters is one which does not, I fear, present much prospect of interest in the eyes of the pharmaceutist; for although some considerable tact is necessary in practice to produce a well manipulated article, the result, after all, is simply a well amalgamated mass, which possesses none of the beauty of the crystalline bodies, the brilliancy and colour of the mineral compounds, or the fragrance of some of the productions of the flower-garden. Nevertheless, for the sake and perhaps comfort of those sufferers who are doomed to wear and bear with plasters, the following communication upon two of our Pharmacopœia plasters may, I hope, be submitted with some appearance of reason.

It is not an unusual source of complaint against the emplastrum opii that it runs beyond the margin, and not unfrequently penetrates through the leather, especially if of chamois, and stains in an unpleasant manner the clothing next in contact with it. The first of these annoyances is probably due to one of the two causes: either that the plaster has not been heated sufficiently long to drive off the water employed in dissolving the extract of opium used in the plaster; or, which seems more probable, to the liquefying nature of the gum Thus.

This inconvenience might, I believe, be avoided by using resin plaster instead of gum Thus. With a view of depriving the plaster of the objectionable colour, I propose substituting one of the salts of morphia for the opium, as I can see no valid reason why all the soothing qualities of opium as an external application should not be fully obtained thereby, and, from what I have heard, am induced to believe that the result would be more certain and equally good. According to the following form, a very suitable plaster may be prepared, almost colourless, and, I think, well adapted for the purpose. It possesses this advantage in its

preparation, that there is no necessity for straining, which accompanies the use of Thus, and every pharmaceutist may, without any inconvenience, make his own, thereby ensuring the presence of the proper quantity of the morphia:—

Take of Lead plaster, 6 ounces
Resin plaster, 4 ounces
Acetate of morphia, 1 drachm
Acetic acid
Water of each, 4 drachms

Melt together by means of a water bath the lead and resin plasters; when melted, stir in the acetate of morphia, dissolved in the acetic acid and water; continue the heat until the acid and water are driven off, which may be ascertained in the usual way, by dropping a portion of the plaster on a slab and working with the finger, when the water, if present, will ooze out.

To the emplastrum belladonna, as now ordered and prepared, the following objections have been made: in the first place, it will not adhere; in the second, the odour is often found unpleasant, and the colour, when it spreads and adheres to the linen, equally disagreeable. In the Pharmacopœia of 1836 it was made with resin plaster and extract of belladonna in the proportion of one part of extract to two of plaster; it was a source of complaint that this plaster frequently produced irritation instead of ease. This was probably considered as being due to the resin plaster, and so, in the next edition of the Pharmacopœia, soap plaster was substituted for resin, and an equal quantity of extract and plaster used, being exactly double the previous amount of extract. This change made the product perfectly non-adhesive, an adhesive margin being now found to be absolutely necessary, and from the increase of extract, the plaster being proportionately soft, is now more liable to spread and run about than before. As with the opium, so would I suggest with this. Employ atropine in lieu of the extract of belladonna; as it is almost impossible to calculate the relative strength of atropine to the extract; but knowing that two grains of atropine dissolved in eight ounces of water produce a solution sufficiently strong to dilate the pupil of the eye, the following form has occurred to me:—

Take of Lead plaster, 6 ounces
Resin plaster, 4 ounces
Atropine, 2 grains
Acetic acid, 2 drachms
Water, 6 drachms

To the melted plasters add the atropine, dissolved in the acid and water, and proceed as in the previous case. Clean plasters, with a good adhesive quality, without the power of irritating, and possessing, I believe, all the advantages offered by the old plasters, have been thus prepared, and may, I think, be found an improvement.

18, *Conduit Street, March 10th*, 1860.

ON THE ADULTERATION OF CARMINE.

BY J. ATTFIELD,
Demonstrator of Chemistry at St. Bartholomew's Hospital.

The colouring matter of the cochineal insect has been shown by Dr. De la Rue* to be a definite, though scarcely crystalline, proximate principle; and from its source and properties has had the name *carminic acid* given to it. This acid united with about five per cent. of alumina, or sometimes with oxide of tin, and occasionally with albumen, should constitute the manufactured carmine of commerce.

The great value of carmine as a pigment depends upon the facts that it is richer, more transparent, and a smaller quantity goes further, than any other

* *Pharmaceutical Journal*, First Series, vol. vii., p. 432.

colour of similar hue. It is largely used by artists, especially in miniature painting, also by artificial flower makers, perfumers, confectioners, red-ink manufacturers, and—when mixed with powdered French chalk, starch, &c.—as a face-paint, under the name of *rouge*.

That for all these purposes carmine is adulterated is probably well known; indeed, its great expense would at once point it out as an article peculiarly liable to sophistication. Moreover, most of the works on Applied Chemistry indicate that it is likely to contain vermilion, and that a test of its purity is its being completely soluble in solution of ammonia, in which, of course, vermilion is insoluble. Practised artists well know this, and, as I am informed by Mr. Ince, often will not purchase carmine unless the test is performed in their presence.

The extent, however, to which this adulteration is carried is, I think, not generally suspected; nor is it commonly known that chrome-red (dichromate of lead) is often used as an adulterant in the place of the more expensive vermilion. For these reasons it has occurred to me that a statement of the results of a quantitative examination of fifteen different samples of carmine would not be without some practical interest to the members of the Society.

Starting with the assumption that carmine might be contaminated with vermilion, chrome-red, red lead, dragon's blood, and possibly some other matters that would be sure to show themselves in the course of analysis, the following was the method of examination finally adopted. A decigramme (one and a half grains) was digested for a short time in about half an ounce of weak solution of ammonia, the mixture thrown on to a weighed filter, and the filter washed with warm distilled water, dried at 212° F., and weighed; the loss of weight suffered by the decigramme would then indicate what per-centage of the carmine had been dissolved by the ammonia. In addition to carminic acid, the ammoniacal solution would, I suppose, contain any oxide of tin or albumen that might have been present; but, as these are necessary ingredients of carmine, and are never contained in that pigment in a sufficiently large quantity for them to be classed as adulterants, I did not think it important to take any further trouble about them. The filter, retaining alumina and the adulterating agents mentioned, was then treated with benzole, which has the property of dissolving dragon's blood with formation of a deep red solution. Dragon's blood was not, however, found in any of the samples, and the filter, after the benzole had been removed by evaporation, was in each case treated with hydrochloric acid; by this means everything was dissolved off except vermilion, which could be washed, dried, and weighed, the loss since the previous weighing giving, of course, the amount of alumina removed by the hydrochloric acid—red lead, and chrome-red not being found in any specimen that contained vermilion. If chrome-red were present in the sample, the filter, after treating with hydrochloric acid, was found to possess its own original weight, and, therefore, the difference between that and the previous weighing gave the amount of chrome-red, including what little alumina might be present with it. In all cases the presence of the substances enumerated was confirmed by qualitative examination. Red lead was not found in any of the specimens examined, and of course alumina was not classed as an adulterant. It was not perhaps necessary to further recognize the vermilion, as scarcely any other colouring matter could be found under such circumstances; nevertheless, the test for that substance given some years ago by Bolley (*Annales de Pharmacie*, 75, 239) was found to be so very applicable that it was always used. It consists in adding to the vermilion a drop or two of solution of nitrate of silver containing considerable excess of ammonia; a black colour is quickly produced owing to the formation of sulphide of silver. The method of applying the test consisted simply in placing a drop of it on the filter over which was spread the vermilion from the decigramme of carmine, when a black spot was instantly produced.

The following table exhibits at a glance the results of the examination:—

Composition of Commercial Carmine.

	In 100 Parts.					
	Carmine.	Alumina.	Vermilion.	Chrome-Red.	Cost of 10 grs.	Actual Value of ditto.
I.	99.4	.6			5*d.*	5*d.*
II.	63.0	6.0	31.0		5*d.*	3½*d.*
III.	35.5	say 2.0		62.5	10*d.*	2*d.*
IV.	91.5	"	a trace 8.5	chiefly	4*d.*	4¾*d.*
V. In powder	76.7	3.6	19.7		10*d.*	4*d.*
Va. In lumps	90.7	3.6	5.7		7½*d.*	4¾*d.*
VI.	46.6	3.4	50.0		3½*d.*	2½*d.*
VII.	26.8	say 2.0		71.2	3*d.*	1½*d.*
VIII.	29.4	2.1	68.5		4*d.*	1¾*d.*
IX.	21.8	7.2	71.0			
X.	28.3	6.0	65.7			
XI.	28.2	4.0	67.8			
XII.	96.2	2.5			7*d.*	5*d.*
XIII.	95.2	2.5			7*d.*	5*d.*
XIV.	23.0	a trace	77.0		1*s.* 5*d.*	1¼*d.*

The first eight samples were purchased at the leading retail drug establishments of the north, south, east, and west ends of London. Number nine was from a large wholesale perfumer, said to be a manufacturer of carmine; numbers ten and eleven were from a wholesale druggist—they are probably identical, though said to be of different qualities; numbers twelve and thirteen were from first-class artists' colourmen; and number fourteen from a West-end house generally noted for the sale of pure chemicals.

Differing as these samples do in the amount of adulteration practised, it is not surprising that equal weights should differ also in price. One would expect, however, that the less real carmine a specimen contained the less price it would be charged; and in some instances this is the case, though, to be sure, even here we find the per-centage of real carmine decreasing in a far greater ratio than the cost. But in the other adulterated samples the very reverse obtains; for the more the money that is paid for them so much the less is there of carmine contained in them; this is peculiarly the case in numbers five and three, but especially so in number fourteen—the sample from the establishment noted for unsophisticated preparations—ten grains of which cost seventeen-pence, but have a real value, as compared with number one, of only five farthings. Number one was taken as the standard of comparison, first because it is pure, and second because it was obtained from a West-end house, than which there is none in the trade better able to judge of the price an article should be supplied at.

It will be observed that in the foregoing examination no notice is taken of the possible admixture of inferior with superior tinted carmines, or of the adulteration of carmine with other lakes of a similar colour. An attempt was made to give expression to the varied intensity of colour of the several ammoniacal solutions of the carmines, but without any definite success. Of course, of two specimens both perfectly soluble in solution of ammonia, that one will be the better which has the deepest and richest hue, provided always that equal weights of the two have been taken.

In conclusion, this examination shows that, except for the use of first-class artists, carmine is nearly always largely adulterated. That the adulterant used is generally vermilion, but sometimes chrome-red. That the price of carmine is far from being a good indication of its real value; and that the only test of its true worth is apparent perfect solubility in solution of ammonia combined with richness and depth of colour in the resulting solution.

PHARMACEUTICAL SOCIETY, EDINBURGH.

ANNUAL MEETING.

The above Meeting was held in George Street Hall, on Friday evening, 20th current, at 8 o'clock,

MR. RAIMES, PRESIDENT, IN THE CHAIR.

THE PRESIDENT'S ADDRESS.

Gentlemen,—When you did me the honour of appointing me President for the session now about to close, I felt some reluctance in accepting the favour offered. It was not, however, from the want of a proper interest in the affairs of the Society, but a fear lest the onerous duties attending such an honourable position would not be properly and efficiently fulfilled. I must confess, however, that I have been well rewarded by your kindness; for since I have occupied this chair, I have been both instructed and delighted by the interesting papers, experiments, and discussions which have from time to time come before us during the session, and, I doubt not, a similar feeling prevails amongst all who have been able to avail themselves of those

scientific meetings. Societies, such as our own, have more than once emanated from the exertions and talents of individual men, and I know no case of a more noble kind than that of the Pharmaceutical Society of Great Britain. I make this allusion, because the first time I was called upon to preside at the council board, was to express sympathy and regret at the great loss the Association had sustained by the death of its founder, Jacob Bell. A monument is now being reared to the memory of this great and respected man, in the shape of a Scholarship, to be entitled the "Bell Memorial Fund," which has been responded to throughout Great Britain. There is yet room for additional aid towards this most desirable object from some of our northern friends. As is usual, I will glance at the various subjects brought before us during the session.

At our introductory meeting, the late lamented Professor George Wilson gave an able and interesting paper on the Education of the Pharmaceutical Chemist, the importance of which speaks for itself. Without entering into the merits of this able communication, I may be allowed to express the hope that many of the suggestions enunciated by our late friend may in due time be fully appreciated.

At our next meeting, we had an interesting lecture, illustrated by most conclusive experiments, by Dr. Stevenson Macadam, on the best means for rendering cotton, muslin, &c., non-inflammable. On the same evening, we had from our Secretary a very lucid description of the improved manufacture of that once trifling article, the lucifer match, but now in such immense demand, that tons of phosphorus and sulphur are consumed annually in the manufacture.

At the following meeting, Dr. Robert Ferguson gave a lecture on the various modes of evolving electricity, and amongst other contrivances explained and showed in operation one of Winter's Colossal Electrical Machines. Thereafter, a paper was read on chloroform by Mr. Crossby, one of our Associates; and here I cannot but regret how seldom any of our juniors afford us a similar opportunity of hearing such communications.

We have also had a clever communication from Dr. Murray Thomson on the use of honey as a vehicle for administering remedies externally. Following this, we had on the same evening, by Mr. Hart, College Street, some remarks on an improved construction of the induction coil, which he illustrated by various and beautiful displays of light.

I have every reason to believe our new Pharmacopœia is in a forward state of completion. This one universal reference book will be held by the Chemists and Druggists as a great boon, and I doubt not less so by the faculty. Our Museum, owing to the kindness of friends, continues to improve in point of interest every year, while our Library is also gathering its share of useful knowledge. One circumstance I much regret, namely, we have not had one essay lodged this session for the President or Registered Fund Prize. I have the pleasure, however, to intimate that the Committee have arranged to extend the time till the 1st of October, so that all papers intended for competition must be lodged by that date with the Secretary, accompanied as usual with motto and sealed envelope. I may state that though no prize has been taken in our own Society, one of our pupils, Francis Greig, an apprentice at Mr. Mackay's, 121, George Street, has honourably distinguished himself at Dr. Macadam's Lectures on Chemistry, having carried off one of the prize medals for written questions on Organic Chemistry, thus having surpassed others of riper years and longer study. I will only add, that this is some encouragement to those who toil behind the drug counter, because the road to advancement and honour is open to all.

In conclusion, thanking you for your kind attention on this and previous occasions, I now beg to call upon the Secretary for the Report.

The Secretary then read

THE ANNUAL REPORT.

The termination of the winter session and the approaching annual meeting in London, call upon the Council of the North British department of the Society to lay

before the members a report of the proceedings which have taken place here during the year 1859.

At the very outset the Council cannot refrain from alluding to the great, and they would even add, irreparable loss the Society has sustained since the last annual meeting in the death of its founder, Mr. Jacob Bell. Increasing suffering and weakness gave certain indication that death was slowly but surely about to seize on one who for nearly twenty years had devoted his time, energies, and talents to the advancement of Pharmacy in this country. Too surely and sadly was this foreboding realized, for within two months of the last annual meeting our respected and esteemed President was laid in the grave.

It would scarcely be in good taste, nor would it answer any purpose, to repeat here the well-merited eulogiums passed by various bodies upon the successful labours and untiring efforts of Jacob Bell. Few men have been destined to fulfil such a mission as that so ably performed by him whose loss has been so deeply felt, so much deplored, and so universally regretted. The present generation of Pharmaceutists will ever admire the genius, talent, and perseverance which distinguished his career, while those who may succeed will learn to revere and honour the memory of him, who so successfully planted the standard of increased education among the Chemists and Druggists of his day, and who so well and so ably fought the battle of the Pharmacy Bill until it became the recognized law of the land.

In like manner the Council cannot but refer to another loss sustained by death, not only to this Association, but to society at large, in the removal of Professor George Wilson, one of the honorary members of the branch here. Known by a world-wide reputation in the scientific world, he was equally beloved in the private social circle, where he was truly endeared by a sincerity of manner and kindness of disposition, which were as pleasing as they were unaffected. The interest he felt in the general body of Pharmaceutists was well known and frequently took practical shape, as lately evinced by the opening address he gave at the commencement of the present session. His loss we have indeed much cause to mourn.

During the bygone winter there have been only four scientific gatherings, and the Council again urge members to be up and doing in the way of contributing towards an increase in these meetings.

No change has yet been made in the manner of receiving the admission fee of members after having passed their examination; and the Council, without again going into the merits of this question, regret that some notice has not been given to the all-important subject so frequently referred to by them, of some alteration in the bye-law which requires an immediate payment of £15 15*s.* from all who by examination become members of the Society. It is still thought that the Society might be strengthened numerically were some means devised of abating this one payment, and rather spreading it over a series of years.

The Council view with much satisfaction the near completion of the National Pharmacopœia, and hope ere long that this much-to-be-desired volume may be in the hands of medical practitioners and pharmaceutical chemists, feeling assured that such a compilation will be found a great boon to both.

The Library and Museum still continue to be in a state of efficiency, and the Council take this opportunity of thanking contributors, as well as to recommend, that increased exertion be made during the summer months to increase the number of specimens in the Museum, and add to the already existing interest of this department of the Society. Catalogues may now be had, as a guide against supplying duplicates. The thanks of the Society are tendered to the curators, for their time and trouble in taking charge of the Library and Museum.

The Council also thank all those who have in any way assisted in keeping alive the interest of the scientific meetings, some of which have conveyed much useful information.

The following is an account of the Secretary's intromissions, from 1st January to 31st December, 1859:—

SECRETARY.

Dr.

1859		£	s.	d.
	Cash from London	50	0	0
	Dec. 31. Balance due Secretary	14	9	8
		£64	9	8

Cr.

1859		£	s.	d.
	Postages	2	14	3
	Porterage, Delivering Billets, &c.	1	17	0
	Advertising	1	1	0
	Expenses of various Meetings, Annual, &c.	8	8	0
	Rent	25	0	0
	Cleaning Rooms	1	10	0
	Insurance	0	7	6
	Printing, including Museum and Library Catalogues	14	4	6
	Books for Library	6	18	6
	Painter's account	2	1	0
	Paper, Envelopes, &c. &c.	0	7	11
		£64	9	8
1859	Dec. 31, Due Secretary	£14	9	8

We, the undersigned, have examined the foregoing accounts, with vouchers attached, find them correctly stated and entered, and the balance due to the Secretary at 31st December, 1859, fourteen pounds nine shillings and eightpence sterling.

JAMES GARDNER.
WILLIAM AINSLIE.
J. R. YOUNG.

Edinburgh, 20th April, 1860.

The Council would hail with much satisfaction the introduction of some suitable measure for regulating the sale of poisons, and although no Act of Parliament has yet been proposed to meet the views of those most deeply concerned; and though no Bill has as yet been introduced containing provisions of such a kind as would render its working either practical or pleasant, the Council do hope that in any endeavour to provide for public safety in regard to the sale of poisons, it will not be overlooked, that no real and practical security can be given, unless it be rendered imperative that all persons before having the privilege of selling the very poisonous materials, some of which have of late proved so destructive to human life, shall have undergone a full and fair examination, fitting them for dealing in such dangerous medicinal and chemical substances.

The Council, in conclusion, think that thanks are specially due to the office-bearers of the Society in London, for the efficient manner in which they have hitherto conducted the affairs of the Association, and take the present opportunity of expressing increased confidence in their vigilance during time to come, in all things concerning the real welfare of the Pharmaceutical Society.

Edinburgh, 20th April, 1860.

The Meeting unanimously approved of the Report, and the Chairman then proposed that Mr. J. R. Young be elected President, and Mr. William Ainslie Vice-President, for the next year. Carried with acclamation.

Mr. ROBERTSON then moved that the following be elected as Council:—The President and Vice-President, Messrs. Raimes, G. Blanshard, Flockhart, Kemp (Portobello), Finlayson (Leith), Gardner, Lindsay, J. F. Macfarlan, Aitken, Hart (Glasgow), Murdoch (Falkirk), and D. Russel (Dundee). Carried unanimously.

Mr. AITKEN proposed the following as Examiners for the ensuing year:—The President and Vice-President, Messrs. Gardner, Robertson, J. F. Macfarlan, Flockhart, Kemp (Portobello), Mackay, and the President and Vice-President in London *ex officio*. Seconded by Mr. BLANSHARD, and carried unanimously.

Mr. KEMP, of Portobello, moved the thanks of the meeting to Mr. Macfarlan for his labours in London, and hoped he would continue to give his services there. Seconded by Mr. ROBERTSON, and carried with acclamation.

Mr. YOUNG proposed the re-election of Messrs. Ainslie and Stephenson, as Curators of the Museum and Library, which was also carried.

Mr. G. BLANSHARD proposed that Mr. Mackay be requested to continue to act as Secretary, and thought the Society much indebted to him for his services in this capacity for so many years. Mr. HART, of Glasgow, heartily seconded this motion, and it was accordingly carried.

The new President, Vice-President, and the Secretary having severally replied, Mr. Robertson proposed a vote of thanks to Mr. Raimes as Chairman, and the meeting thereafter adjourned.

THE ANNUAL SUPPER

took place on the same evening, at half-past nine o'clock, in the Café Royal, Register Street, Mr. J. R. Young, Chairman, and Messrs. Ainslie and G. Blanshard, Croupiers. About seventy sat down to an elegant entertainment. Letters of apology were read from Professor Christison, Dr. Douglas Maclagan, Mr. Flockhart, &c., &c. After the usual loyal toasts, the Chairman proposed the "Pharmaceutical Society," in a very able and eloquent speech; after which, the following were proposed and duly responded to:—"The Royal College of Physicians," by Mr. Ainslie; "The Memory of Jacob Bell," in solemn silence, by Mr. J. F. Macfarlan; "The Honorary Members in Scotland," by Mr. Robertson; "The President and Council in London," by Mr. Raimes; "The Retiring President," by Mr. Hart, of Glasgow; "The Associates and Apprentices," by Mr. Nicoll; "Mr. Kemp and the Country Members," by Mr. G. Blanshard; "Mr. Hart and Prosperity to the City of Glasgow," by Mr. John Mackay; "Mr. J. F. Macfarlan," by Dr. S. Macadam; "Dr. Murray Thomson," "Dr. James Young," "Dr. Gray," and the "Visitors," by Mr. Kemp, Portobello; "Board of Examiners and Council in Scotland," by Dr. Gray; "The Chairman," by Mr. Aitken; "The Croupiers," by Mr. Stephenson; "The Secretary," by Mr. Ainslie.

Several excellent songs were sung throughout the evening, and the company broke up at a late hour, well pleased with the harmony pervading the general arrangements so well carried out for the comfort of those who had attended.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Thirteenth Meeting of the Session was held in the Royal Institution, Colquitt Street, on the 29th March;

JOHN ABRAHAM, ESQ., IN THE CHAIR.

The Secretary announced some donations to the Library; after which

Dr. Mitchell proceeded to deliver the lecture of the evening "On the New Theory of Sound in reference to Hearing." The lecture was illustrated by several well executed drawings of the anatomy of the ear, and the mode in which sound is conducted along the canal.

The Chairman proposed a vote of thanks to Dr. Mitchell, which was carried unanimously.

Royal Institution.

The Fourteenth Meeting of the Session was held on April 12,

THE PRESIDENT IN THE CHAIR.

Mr. J. C. Thompson was elected a Member, and Mr. J. Preston an Associate.

The Secretary having announced the donation of the Report of the Committee of the Royal Institution for 1859,

Mr. Walker, the Librarian of the Association, called the attention of the meeting to the desire which had been manifested by a number of the Members and Associates that arrangements should be made for the acquisition of more practical information on botany, zoology, and natural history generally, and concluded by moving that a club to be called the "Natural History Club" should be formed, and be composed exclusively of Members and Associates of the Association, and that occasional excursions to the country should form one of the principal means of promoting the object in view.

The motion appeared to meet with the approval of the meeting, and the President suggested that those gentlemen who were anxious to join the club should at once communicate with Mr. Walker or the Secretary.

The PRESIDENT then called upon Dr. Inman to deliver the lecture of the evening "On Food." The lecture having been delivered *extempore*, we are only enabled to give a very brief outline.

Dr. INMAN commenced by observing that having been invited to deliver a lecture "On Food," and complying therewith, he almost regretted that he had done so, not that the subject of food was not a sufficiently extensive and interesting one, but that a difficulty presented itself in selecting what might be acceptable to the members of this society. In entering upon this subject the question which at once presents itself is "What is Food?" and the reply from some of them would probably be "Bread, butter, beef," &c., and this, of course, would be perfectly correct; but if they confined their opinion as to what constituted food to those articles used in this country, the number would be found very limited indeed when compared with the substances which constitute the food of the human race throughout the world. Food may be more correctly defined to be that substance which replenishes the waste to which the body is constantly subject, and whatever that substance may be, if it is taken into the stomach, digested, and assimilated, and forms a portion of the tissue of the body, it is to all intents and purposes "food." And in looking abroad in the world we find that the food of man is as varied as it well can be. At home we relish and consider necessary for our existence a sufficient supply of bread, beef, mutton, potatoes, butter, &c.; if we direct our attention to other countries we find that the Scotchman enjoys permanently his broth and his oatmeal, and the Irishman would not give up his farinaceous tuber, the potato, for any substance which we might offer him in exchange. If we cross the Channel, we shall find that the Frenchman is happy when discussing his steak taken from the tenderest joint of the horse, or the more delicate *morceau* in the form of a dish of frogs, followed by his thin *vin ordinaire*. The Italian enjoys his lupines; the Greek considers the donkey tender and delicious; while the Chinaman esteems the dog as especially savoury, and in some countries the monkey is a very favourite dish, the flesh being considered delicate, and the only drawback to its use would be the qualmy feeling which it is apt to induce in sensitive stomachs in consequence of the dish when served up looking very like one of our own species of tender age. And, lastly, the Esquimaux and the Greenlander luxuriate in the blubber and oil obtained from the whale to their hearts' content.

The lecturer next adverted to the chemical theories involved in the process of nutrition, and considered the deductions of Liebig on some points grossly opposed to facts.

For convenience, he divided the subject of food into four parts: 1st, strong food, or that which is only adapted for strong stomachs; 2nd, weak food, or that which is easily digested by weak stomachs; 3rd, special food; 4th, liquid food. The consideration of the various substances belonging to the above divisions were fully entered into, and the effects of some in producing disease, and of others in preserving health, were noticed. The question as to the cause and prevention of scurvy occupied a considerable portion of the lecture; and, in reference to the therapeutic action of lemon juice, he stated his own conviction, in which he was borne out by others, that lime and lemon juice did not generally retain their antiscorbutic properties beyond a period of two years, notwithstanding that the citric acid remained in solution in normal quantity.

In reference to the prevention of scurvy, dysentery, and other diseases arising from similar causes, he attributed the utmost importance to the liberal use of a sufficient variety of fresh provisions; and incidental to this part of the subject, the best and most efficient mode of preserving vegetable substances became an important consideration. The lecturer next adverted to the indigestibility of various kinds of food; showing that this was attributable in a large number of cases to idiosyncrasy, but, at the same time, considered that the stomach was capable of being *educated* and brought into a condition capable of digesting those substances which it had formerly rejected. He, however, denounced the system of some parents forcing their children to eat such food as they had a natural aversion to. He gave some instances in which raw meat had proved very beneficial, especially in consumption, the desire for it having been expressed by the patients themselves, and in these instances its digestibility was fully established. In some parts of the world raw meat was the rule, cooked meat the exception, particularly amongst the Abyssinians; but one

great drawback to its constant use was the prevalence of intestinal worms, which are apt to be generated by its use, hence the Abyssinian remedy of kousso.

The weaker foods, or those more easily digestible, were next considered; after which the special foods engaged attention. There were selections from what had already been spoken of, and had reference to the special adaptation of certain kinds of food for the treatment of certain diseases.

Dr. Inman having been employed professionally in examining the food supplied for the use of the soldiers and crew of the "Great Tasmania," stated his opinion that the cause of the deaths occurring on board that vessel was not exclusively from the use of bad food, but from the non-adaptation of the food to the condition in which the soldiers were during the voyage. The last division of the subject, liquid foods, was next alluded to, in which Dr. Inman combated the erroneous notions entertained by the teetotallers in reference to alcoholic drinks not only being useless, but positively injurious and poisonous. He gave instances where a number of patients, even children, had experienced the greatest benefits from prescribed alcoholic drinks. The effects of spirits and fermented liquor on the animal economy was fully examined, and he satisfactorily established that the temperate use of them was not antagonistic to the due preservation of the health and strength in healthy subjects, and also that if alcoholic or fermented drinks were not taken, a greater quantity of non-nitrogenous food would be necessary.

An interesting and animated discussion followed, in which the President reviewed some of the more interesting points alluded to in the lecture. Mr. Mercer defended the almost universally received theory of Liebig in regard to the chemistry of food, and stated his belief that the antiscorbutic property attributed to lemon juice was due to the potash salts which it contained, and not exclusively to the citric acid, as was formerly supposed. Dr. Fletcher made some observations in reference to the physiology of digestion, and remarked the almost universal desire for food seasoned with plants of the alliaceous order, expressly amongst the lower classes, and expressing his belief that the beneficial effects of these substances was much more general than many were led to suppose.

A vote of thanks having been passed to Dr. Inman, the proceedings terminated.

NEWCASTLE AND GATESHEAD BRANCH ASSOCIATION.

At the *Conversazione* held on the 16th ult., in the rooms of the Association, St. Martin's Court, Newcastle, there was a considerable attendance of members, and those interested in their proceedings. The tables were covered with objects of interest — microscopes, a large series of nature prints, specimens of drugs not usually met with in commerce, a number of stereoscopes, &c.

At nine o'clock Mr. R. Mann was called to the chair.

After a few appropriate remarks from the chairman, Mr. B. S. Procter was called upon to read a paper which he had consented to prepare for the evening, "On the Manufacture of Ink."

Mr. Procter at the outset made apology for himself and for his subject, and proceeded to read a paper of great interest, embodying the results of a long series of experiments made with respect to most of the published formulæ for writing fluids. Specimens of inks prepared according to many of these were shown, and writing produced by them. The subject was also experimentally illustrated by the effect of various chemical agents upon the colour and condition of several of the samples. A somewhat lengthy discussion followed, after which the Secretary was called upon to give some account of the proceedings of the Association during the past year.

Mr. H. B. Brady said that he had not thought it necessary to draw up any written report for presentation at this meeting, as there was probably no good end to be gained by such a formality, but that he would briefly review their course during the year they had existed as a Society, for the information of any who had not taken an active part in connexion with it.

The Association was formed in April, 1859, principally with a view of affording to those who desired it opportunity for attending lectures on the various subjects comprised in the examinations of the Pharmaceutical Society. Nearly twenty young men from the leading pharmaceutical establishments of the town joined the Association at its outset, and this number was increased at the commencement of the winter session. Four courses, comprising in all nearly seventy lectures, had

been delivered during the year, and the attendance had generally been very satisfactory. It would be unnecessary to speak of the prospect for the coming summer as the programme had already been circulated. It had been a matter of regret to the Committee that they were not yet in a position to award the prizes which had been offered, as the unavoidable absence from town of Dr. Adriani had delayed the requisite examinations. The books selected for the prizes were on the table, and merited inspection. The Secretary briefly called attention to the collections of dried plants which were in the room; they were principally made by two or three students last summer and autumn, and were interesting as a result of the botanical lectures.

Votes of thanks were passed to Dr. A. Adriani for his gratuitous services as Lecturer on Chemistry during the winter, and to Mr. W. Procter for his course on Inorganic Materia Medica; and some other minor business was disposed of.

The Chairman, in conclusion, expressed the gratification it afforded him to be able in any way to assist in an undertaking like the one in which they were engaged. He urged the younger members of the profession to educate themselves up to the prospective standard of the Pharmaceutist. The old routine methods of conducting business were changing fast; as an older man he could speak confidently on this point. He charged them to consider lectures in the light of hints to enable them to educate themselves rather than as dogmatic instruction.

The meeting separated at a late hour. Appended is the programme for the summer lectures.

"A course of lectures on 'Vegetable Materia Medica and the History of Drugs' will be delivered by Mr. Robert Mann, in the rooms of the Association, St. Martin's Court, Newgate Street, Newcastle, commencing on Wednesday, the 2nd inst. To be continued on each successive Wednesday during the months of May, June, and July. A course of lectures on the 'Principles of Botany' will be delivered by Mr. Henry B. Brady, F.L.S., commencing on Monday, the 7th inst. To be continued on each successive Monday during the months of May June, July, and August. The lectures will commence each evening at half-past eight o'clock punctually."

ORIGINAL AND EXTRACTED ARTICLES.

ON THE ARSENIC EATERS OF STYRIA.

BY CHARLES HEISCH, ESQ., F.C.S.,
Lecturer on Chemistry at the Middlesex Hospital Medical College.

At the last meeting of the Manchester Philosophical Society I observe that Dr. Roscoe called attention to the arsenic eaters of Styria. Having for the last two years been in communication with the medical men and other residents in the districts where this practice prevails, I shall feel obliged if you will allow me through your journal to make known the facts I have at present collected. The information is derived mainly from Dr. Lorenz, Imperial Professor of Natural History, formerly of Salzburg, from Dr. Carl Arbele, Professor of Anatomy in Salzburg, and Dr. Kottowitz, of Neuhaus, besides several non-medical friends. If human testimony be worth anything, the fact of the existence of arsenic eaters is placed beyond a doubt. Dr. Lorenz, to whom questions were first addressed, at once stated that he was aware of the practice, but added, that it is generally difficult to get hold of individual cases, as the obtaining of arsenic without a doctor's certificate is contrary to law, and those who do so are very anxious to conceal the fact, particularly from medical men and priests. Dr. Lorenz was, however, well acquainted with one gentleman, an arsenic eater, with whom he kindly put me in communication, and to whom I shall refer again more particularly. He also says that he knows arsenic is commonly taken by the peasants in Styria, the Tyrol, and the Salzkammergut, principally by huntsmen and woodcutters, to improve their wind and prevent fatigue. He gives the following particulars:—

The arsenic is taken pure in some warm liquid, as coffee, fasting, beginning

with a bit the size of a pin's head, and increasing to that of a pea. The complexion and general appearance are much improved, and the parties using it seldom look so old as they really are, but he has never heard of any case in which it was used to improve personal beauty, though he cannot say that it never is so used. The first dose is always followed by slight symptoms of poisoning, such as burning pain in the stomach and sickness, but not very severe.

Once begun it can only be left off by very gradually diminishing the daily dose, as a sudden cessation causes sickness, burning pains in the stomach, and other symptoms of poisoning, very speedily followed by death.

As a rule, arsenic eaters are very long lived, and are peculiarly exempt from infectious diseases, fevers, &c.; but unless they gradually give up the practice invariably die suddenly at last.

In some arsenic works near Salzburg with which he is acquainted, he says the only men who can stand the work for any time are those who swallow daily doses of arsenic, the fumes, &c., soon killing the others. The director of these works, the gentleman before alluded to, sent me the following particulars of his own case. (This gentleman's name I suppress, as he writes that he does not wish the only thing known about him in England to be the fact that he is an arsenic eater; but if any judicial inquiry should arise which might render positive evidence of arsenic eating necessary, his name and testimony will be forthcoming.)

"At seventeen years of age, while studying assaying, I had much to do with arsenic, and was advised by my teacher, M. Bönsch, Professor of Chemistry and Mineralogy at Eisleben, to begin the habit of arsenic eating. I quote the precise words he addressed to me. 'If you wish to continue the study of assaying, and become hereafter superintendent of a factory, more especially of an arsenic factory, in which position there are so few, and which is abandoned by so many, and to preserve yourself from the fumes which injure the lungs of most, if not of all, and to continue to enjoy your customary health and spirits, and to attain a tolerably advanced age, I advise you, nay, it is absolutely necessary, that besides strictly abstaining from spirituous liquors, you should learn to take arsenic; but do not forget when you have attained the age of fifty years gradually to decrease your dose, till from the dose to which you have become accustomed, you return to that with which you began, or even less.' I have made trial of my preceptor's prescriptions till now, the forty-fifth year of my age. The dose with which I began, and that which I take at present, I enclose; they are taken once a day, early, in any warm liquid, such as coffee, but not in any spirituous liquors." The doses sent were No. 1, original dose, three grains; No. 2, present dose, twenty-three grains of pure white arsenic in coarse powder. Dr. Arbele says this gentleman's daily dose has been weighed there also, and found as above. Mr. —— continues:—"About an hour after taking my first dose (I took the same quantity daily for three months), there followed slight perspiration with griping pains in the bowels, and after three or four hours a loose evacuation; this was followed by a keen appetite, and a feeling of excitement. With the exception of the pain, the same symptoms follow every increase of the dose. I subjoin as a caution that it is not advisable to begin arsenic eating before the age of twelve or after thirty years." In reply to my question, if any harm results from either interrupting, or altogether discontinuing the practice, he replies, "Evil consequences only ensue from a long continued interruption. From circumstances I am often obliged to leave it off for two or three days, and I feel only slight languor and loss of appetite, and I resume taking the arsenic in somewhat smaller doses. On two occasions, at the earnest solicitations of my friends, I attempted entirely to leave off the arsenic. The second time was in January, 1855. I was induced to try it a second time from a belief that my first illness might have arisen from some other cause. On the third day of the second week after leaving off the dose I was attacked with

faintness, depression of spirits, mental weakness, and a total loss of the little appetite I still had; sleep also entirely deserted me. On the fourth day I had violent palpitation of the heart, accompanied by profuse perspiration. Inflammation of the lungs followed, and I was laid up for nine weeks; the same as on the first occasion of leaving off the arsenic. Had I not been bled, I should most likely have died of apoplexy. As a restorative, I resumed the arsenic eating in smaller doses, and with a firm determination never again to be seduced into leaving it off, except as originally directed by my preceptor. The results on both occasions were precisely the same; and death would certainly have ensued had I not resumed arsenic eating." One of the most remarkable points in this narrative is that this gentleman *began* with a dose which we should consider poisonous. This is the only case of which I have been able to obtain such full particulars, but several others have been mentioned to me by those who knew the parties and can vouch for their truth, which I will briefly relate.

One gentleman, besides stating that he is well aware of the existence of the practice, says he is well acquainted with a brewer in Klagenfürth, who has taken daily doses of arsenic for many years. He is now past middle life, but astonishes every one by his fresh juvenile appearance; he is always exhorting other people to follow his example, and says, "See how strong and fresh I am, and what an advantage I have over you all! In times of epidemic fever or cholera, what a fright you are in, while I feel sure of never taking infection."

Dr. Arbele writes, "Mr. Curator Kürsinger (I presume curator of some museum at Salzburg), notwithstanding his long professional work in Lungau and Binzgau, knew only two arsenic eaters—one the gentleman whose case has just been related, the other the ranger of the hunting district in Grossarl, named Trauner. This man was at the advanced age of 81, still a keen chamois hunter, and an active climber of mountains; he met his death by a fall from a mountain height, while engaged in his occupation. Mr. Kürsinger says he always seemed very healthy, and every evening regularly, after remaining a little too long over his glass, he took a dose of arsenic, which enabled him to get up the next morning perfectly sober and quite bright. Professor Fenzl, of Vienna, was acquainted with this man, and made a statement before some learned society concerning him, a notice of which Mr. Kürsinger saw in the *Wiener Zeitung;* but I have not been able to find the statement itself. Mr. Krum, the pharmaceutist here, tells me that there is in Stürzburg a well-known arsenic eater, Mr. Schmid, who now takes daily twelve and sometimes fifteen grains of arsenic. He began taking arsenic from curiosity, and appears very healthy, but always becomes sickly and falls away if he attempts to leave it off. The director of the arsenic factory before alluded to is also said to be very healthy, and not to look so old as 45, which he really is."*

As a proof how much secrecy is observed by those who practise arsenic eating, I may mention that Dr. Arbele says he inquired of four medical men, well acquainted with the people of the districts in question, both in the towns and country, and they could not tell him of any individual case, but knew of the custom only by report.

Two criminal cases have been mentioned to me, in which the known habit of arsenic eating was successfully pleaded in favour of the accused. The first by Dr. Kottowitz, of Neuhaus, was that of a girl taken up in that neighbourhood on strong suspicion of having poisoned one or more people with arsenic, and though circumstances were strongly against her, yet the systematic arsenic eating in the district was pleaded so successfully in her favour, that she was acquitted, and still lives near Neuhaus, but is believed by every one to be guilty. The

* The man above mentioned seems quite to differ with Mr. ——— on the impropriety of taking arsenic with spirituous liquors, and actually employs it as a means of correcting their effects. All others that I have heard of, concur in saying that it should be taken fasting.

other case was mentioned by Dr. Lorenz. A woman was accused of poisoning her husband, but brought such clear proof that he was an arsenic eater, as fully to account for arsenic being found in the body. She was, of course, acquitted.

One fact mentioned to me by some friends is well worthy of note. They say: "In this part of the world, when a graveyard is full, it is shut up for about twelve years, when all the graves which are not private property by purchase are dug up, the bones collected in the charnel-house, the ground ploughed over, and burying begins again. On these occasions, the bodies of arsenic eaters are found almost unchanged, and recognizable by their friends. Many people suppose that the finding of their bodies is the origin of the story of the vampire." In the *Medicinischer Jahrbuch des Oster: Kaiserstaates*, 1822, *neuest Folge*, there is a report by Professor Schallgruber, of the Imperial Lyceum at Grätz, of an investigation undertaken by order of government into various cases of poisoning by arsenic. After giving details of six *post-mortem* examinations, he says:— "The reason of the frequency of these sad cases appears to me to be the familiarity with arsenic which exists in our country, particularly the higher parts. There is hardly a district in Upper Styria where you will not find arsenic in at least one house, under the name of hydrach. They use it for the complaints of domestic animals, to kill vermin, and as a stomachic to excite an appetite. I saw one peasant show another on the point of a knife how much arsenic he took daily, without which, he said, he could not live; the quantity I should estimate at two grains. It is said, but this I will not answer for, that in that part of the country this poison is used in making cheese; and, in fact, several cases of poisoning by cheese have occurred in Upper Styria, one not long since. The above-mentioned peasant states, I believe truly, that they buy the arsenic from the Tyrolese, who bring into the country spirits and other medicines, and so are the cause of much mischief." This report is, I believe, mentioned in Orfila's *Toxicology*, and one or two other works, but I have not seen it quoted myself; it is interesting, as being early and official evidence of arsenic eating. Since I received the above information, a gentleman who was studying at this hospital, told me that, when an assistant in Lincolnshire, he knew a man who began taking arsenic for some skin disease, and gradually increased the dose to five grains daily. He said he himself supplied him with this dose daily for a long time. He wrote to the medical man with whom he was assistant, and I have been for a long time promised full particulars of the case, but beyond the fact that he took five grains of arsenic, in the form of Fowler's solution, daily, for about six years, and could never leave it off without inconvenience, and a return of his old complaint, I have as yet not received them. I have delayed publishing these facts for some time, hoping to get information on some other points, for which I have written to my friends abroad; but as considerable delay takes place in all communications with them, I have thought it better to publish at once the information I have already received. All the parties spoken of are people on whom the fullest reliance can be placed, and who have taken much pains to ascertain the foregoing particulars. The questions which still remain unanswered are these:—

1st. Can any official report be obtained of the trials of the two people mentioned by Drs. Kottowitz and Lorenz?

2nd. Do medical men in these districts, when using arsenic medicinally, find the same cumulative effects as we experience here? Or is there anything in the air or mode of living which prevents it?

3rd. Can any evidence be obtained as to how much of the arsenic taken is excreted? To show whether the body gradually becomes capable of enduring its presence, or whether it acquires the power of throwing it off.*

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* The fact of the preservation of the bodies shows that some considerable quantity must be retained.

I have proposed to the gentleman who furnished me with the particulars of his own case either to make an estimate of the arsenic contained in his own urine and fæces during twenty-four hours, or to collect the same and forward them to me that I may do so, but as yet have received no answer.

ON THE PRESERVATION OF LEECHES.

BY J. MILL FRODSHAM, M.D.,
Physician to the Farringdon Dispensary.

Hospitals and vendors have endeavoured to derive advantage from leeches by making them serve several times, and especially by preserving them; yet I believe even now a leech is seldom employed twice, the mode adopted and recommended in all books for cleansing them after they have been used being generally fatal. When I was house-surgeon to the County Infirmary, Carlisle, I made numerous experiments to see how often and how long leeches could be employed and preserved without death; for this purpose a small glass vessel was used, in the bottom of which was placed about three inches of peaty earth, and twelve leeches, and then half filled with water, the mouth being secured with a coarse rag. These leeches lived in health for a year with only one or two deaths, many of them being employed twice in one day; but after being used, instead of putting them in salt, or vinegar and water, as usually done, they were placed for a few seconds in the camphor mixture of the Pharmacopœia, and afterwards washed in cold water, avoiding too much contact with the hands. But the apparatus *par excellence* for preserving leeches is the one introduced by M. Vayson, an eminent French breeder, and called by him the "Domestic Marsh." This consists simply of an earthenware vessel in the form of a truncated cone reversed, the lower extremity of which is pierced with a few holes sufficiently narrow not to allow the leech to pass through. This vessel is filled with turfy earth, the leeches are placed in it, and they soon instal themselves as well as they can; then the orifice is closed with a coarse cloth. If desired to be sent to a great distance the earth is wetted in all its thickness, and the vessel packed in a basket or box. If desired to preserve them on the same spot, the lower end of the vessel is placed in a tub, the water of which rises to about the height of four inches, and no further care is required. By the process of infiltration the lower strata of the "marsh" are soon wet through, the upper strata remaining dry; between these two extremes the leeches choose the zone most appropriate for them. M. de Quartrefages, by whom the above was brought before the French Academy, has kept and bred leeches in this way for two years with no deaths. This would lead us to believe that leeches do not live on the blood of animals, but on the infusoria.

The object of this communication is to recal attention to the fact that "*leeches* need *never be thrown away*;" and that hospitals and vendors may be induced to adopt this simple contrivance of M. Vayson, and thus make further experiments on the keeping and breeding of these very useful little creatures; for, as I have shown, they can be kept healthy and employed many times consecutively if properly treated.

Upper Bedford Place, Russell Square, W.C.

REPORT OF THE RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION, AND OF THE APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

Artificial Production of Tartaric Acid from Gum or Sugar of Milk.—M. Liebig has shown that tartaric acid forms one of the products when gum or sugar of milk is oxidized by nitric acid. The experiment is made by mixing

together 1 part of sugar of milk, 2½ parts of nitric acid of sp. gr. 1.32, and 2½ parts of water, and applying a gentle heat ; a mixture of carbonic acid and oxygen compounds of nitrogen is disengaged, and a separation of mucic acid takes place. Water is added and the liquid filtered, half a part of nitric acid is then added and the whole boiled, when a fresh separation of mucic acid takes place—in all 33 per cent. of the lactine employed. The filtered liquid is again boiled, when a disengagement of colourless gas takes place; a little fresh nitric acid is added if necessary, and the boiling continued for eighteen or twenty-four hours; it is then neutralized by potash. The solution contains a large proportion of tartaric acid, which by suitable means may be isolated. The tartrate of potash is sometimes accompanied by needles of saccharate of lime. Oxalic acid is also present in the first liquids, but is decomposed by the boiling with nitric acid. No acetic acid is produced during the operation.

On Methyl-Strychnine and Methyl-Brucine.—M. Stahlschmidt has been engaged* in the production of these bodies, which in one respect at least are somewhat remarkable and interesting. The compound Methyl-strychnine only differs from ordinary strychnine by having one atom of its hydrogen replaced by an atom of methyl, yet the new body appears to be quite harmless, and to have entirely lost the poisonous properties of the body from which it is derived. Five grains of this compound were administered to a rabbit without the production of any dangerous symptoms. Methyl-brucine comports itself in a similar manner. This curious change in the physiological action is more remarkable as the essential chemical properties remain unaltered; moreover, the other substitution products of strychnia, as for instance *chlor-strychnine*, are as powerful in this respect as the normal body. The preparation of these methylated bases is readily effected by treating the alkaloid, in fine powder, with iodide of methyl when the iodide of the new substituted base is obtained. This iodide, although very soluble in hot water, requires 212 parts of water for its solution at the ordinary temperature. It is decomposed by salts of silver, combining with the acid of the salt, and precipitating iodide of silver. It is not volatile. In contact with oxide of silver and water it yields the free base—that is to say, the hydrate of methyl-strychnine. The latter may be more easily obtained by decomposing the sulphate with baryta water. In this case the liquid assumes a slight violet tinge, but nevertheless long yellowish crystals soon appear, which are unchanged in the air, and contain 16 to 17 per cent. of water. This hydrated base is very soluble in water and alcohol, but insoluble in ether ; it displaces the principal metallic oxides from their combinations. Treated with peroxide of lead or bichromate of potash and sulphuric acid it is coloured brown; on the addition of water, brilliant pellicules separate, resembling cantharides.

Coating Glass and Porcelain with Platinum.—In using Marsh's apparatus the point of the glass tube at which the gas is burned frequently fuses, thus sealing up the opening and, of course, stopping the combustion. M. Dullo proposes to avoid this inconvenience by coating the end of the tube with metallic platinum. This he effects in the following manner:—The tube is drawn out in the usual manner, leaving the diameter of the opening slightly larger than it is ultimately required to be. The narrow end is then roughened by means of a file in such a manner as to destroy the smooth surface of the glass. The point is next dipped in a solution of bichloride of platinum, containing about one-twentieth of metal, the excess of the drop removed, and the glass gradually and cautiously heated until it acquires a brilliant metallic appearance : by repeating this four or five times a coating of platinum is obtained sufficient to perfectly resist the hydrogen flames. The tube becomes platinized both inside and outside.

The author also applies this process to porcelain crucibles. The glazed ware is not suited for the purpose, however, and he prefers to use the biscuit ware in its porous state.

Red Cinchonic or Cinchonine.—M. Hlasiwetz has been engaged in the investigation of this body, and states that it has the constitution of a *glucoside*. When its alcoholic solution is treated with chlorine, it is separated into a saccharine substance identical with the *mannitane* of Berthelot, and an acid to which the name of *chinovic*

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* *Annalen des Physik und Chem.*

is given. The acid is obtained as a crystalline powder, insoluble in water, and only slightly soluble in cold alcohol. The strong acids separate it from its combinations in the form of a gelatinous mass. It is monobasic, and is capable of decomposing the carbonates.

The Odour of Horseradish.—M. Hlasiwetz has shown that when an alcoholic solution of iodoform and of sulphocyanide of potassium is heated in a sealed tube for two days, iodide of potassium separates, and a liquid is obtained which contains a sulphuretted essential oil, having the odour of horseradish.

ON THE PROXIMATE ANALYSIS OF PLANTS AND VEGETABLE SUBSTANCES.

BY FREDERICK ROCHLEDER, M.D.

Introduction.

The medicinal action which many plants, or parts of plants, possess, may have been principally the earliest occasion of the examination of plants. It is probable that the analysis of plants, and particularly of their sap, was the first original labour in relation to analytical chemistry, when the term analysis could be scarcely employed in the sense which we attach to this word at the present time. Indeed, some derive the word "Chemistry" from χυμος (the sap), because the sap of plants had been the object of the earliest chemical research. The applicability of many plants to technical purposes was the later and profitable occasion for the analysis of plants and their parts. It is, therefore, evident why the earliest labours were not directed to discover all the constituents of a plant or of its parts, but had for their object the isolation of one or the other of its constituents. Chemists endeavoured to isolate the medicinally active substance, or the poison of medicinal or poisonous plants, and the substances as colouring matters, tannin, &c., of plants, used for industrial purposes, and on these accounts employed. Nevertheless, we very seldom find analyses of all parts of a plant; mostly, analyses were preferred of those parts of plants which were employed in medicine or in the arts. All analyses were undertaken from views which must remain foreign to chemistry as a science, which proceeds without regard to medical or technical objects. Another period commenced first in more recent times in the investigation of plants, in which the former predominating views were more and more thrown into the background; chemists became sensible that one constituent of a plant possessed for the plant the same degree of importance as any other, quite independently of its applicability to different objects. They perceived that all the constituents of a plant must stand in the closest relations to one another; that one is formed from the other, that the existence of one constituent could not be regarded independently of the existence of the others, and that all constituents are links of one chain. The principal result of these new views was an alteration in the method of investigating plants; it could no longer be said to be a one-sided endeavour for the isolation of a substance with a disregard to all other simultaneously existing constituents. It became necessary to search for all the constituents of a vegetable substance by analysis, and to study them closely. The inquiries concerning the process by which one constituent is formed from others, and, according to the nature of its affinities, by conversion into other substances, have rendered requisite more correct analyses with reference to all the constituents.

The first efforts of chemists in the analysis of plants and their parts were limited to the separation of their constituents from one another, as far as it was possible, by their different behaviour to solvents. The substances thus separated, often still a mixture of several bodies, had a peculiar name conferred on them, but their composition, their relation to other bodies, with the exception of some observations concerning their colour, or the precipitates produced by the addition of reagents, were not further investigated. From a resemblance in the properties of individual constituents with bodies already known, their identity with the same was decided upon. While some chemists rather predicted than were able to detect an unlimited quantity of different bodies in various plants by a great number of analyses in the highest degree imperfect, others proceeded to examine more closely the detected constituent individually. It was quite in the nature of things to be expected that

for the investigation of the composition and constitution of their individual constituents, those bodies in particular should be selected which from their properties appeared to give a guarantee of their purity by reason of the facility with which they could be isolated and purified. For example: volatile oils, by the facility with which they are volatilized undecomposed, and are separated at certain boiling points from other volatile substances with some precision; also crystallizable bodies of some permanence which may be easily separated from other amorphous substances by their disposition to assume the crystalline form. These were the objects of attention to those men of science who expected more benefit to chemistry from a fundamental study of some substances than by the discovery of many. Thus, then, it happens that besides some few well-conducted analyses of vegetable substances, we possess a great mass of imperfect analyses, and sometimes an exact chemical investigation of one or the other constituent of a vegetable substance, in which the remaining constituents have received no consideration. There exists, at the present day, no investigation of the various parts of a plant which has been completed so that, uniting the details of each investigation of all the constituents to a whole, could give us a representation of the constitution of a plant.

The investigation of an individual constituent of a vegetable often requires a long time, throughout a great expenditure of patience and sagacity, not to speak of the pecuniary sacrifice combined with them. For these reasons few of the substances have been at present examined in comparison with the great number whose existence is already known. But an exact and complete analysis is endlessly troublesome when the nature of the constituents are not known. This is to be ascribed to the few analyses we possess which correspond to the acquirements of science. For an analysis which informs us what constituents a plant contains in its various parts, in what quantity they are present therein, we seek in vain in chemical works.

As we find only some analyses of plants which possess a value, when we examine the long series of such analyses, so also we search vainly for a definite method according to which they could be arranged. There is no difficulty in explaining why no method is given for the analysis of plants such as we possess in mineral chemistry. Inorganic analysis is, in general, the analysis of defined compounds, the properties of whose elements are, for the most part, correctly known, and likewise the properties of their most important combinations with one another. When the analysis of plants treats of the analysis of mixtures which cannot be separated mechanically, then terminates the precision and certainty of inorganic chemistry, which we boast of when it speaks of only elementary analysis. The investigations of the various minerals, as phonolithe, &c., show how little we know of the means of separating the individual constituents. Every part of a plant is a mixture of many constituents not mechanically separable, the number of contemporaneously existing constituents of such a mixture being infinitely greater than in the most complex fossils. If it be difficult in this case to find out a method of separation, how much more difficult will it be with plants, whose principal constituents are so readily decomposable and changeable that they cannot only be altered by the reagents employed for their separation, but act reciprocally on one another, producing bodies which were not originally present.

When we have to deal, in the analysis of plants, with known compounds, as is mostly the case in mineral chemistry, still the investigation is not easy. In the analysis of a vegetable substance heretofore unexamined, we can reckon almost with certainty on meeting with one or more quite unknown bodies. The intimation which has been already often expressed, that a rational method for the analysis of plants is quite impossible until at least we are correctly acquainted with the majority of vegetable bodies, is, consequently, not without some foundation, for only when we know the properties of the constituents of plants and their combinations can a method be established which will be available for all time. Consequently, both for the present and the next century we must renounce from time to time all methods of vegetable analysis, as it is scarcely possible, in a shorter space of time, for the labours of chemists to study correctly and copiously enough the majority of the constituents of plants. The number of plants is great, and increase yearly by fresh discoveries, and with the number of plants the number of peculiar vegetable substances also increases. Therefore, if we would wait for the establishment of a method of vegetable analysis until we are acquainted with the majority of all vegetable bodies,

we should never arrive at one, because we can only know the properties of these bodies by organic analysis. But to investigate plants without such a method of analysis tends to aimless researches. However, this is clear, that every method of vegetable analysis which is arranged for the present can be only a provisional one, which must be made more comprehensive as soon as the knowledge of the constituents of plants has been extended by its aid—in other words, the provisional method is the means to arrive at better methods.

With the majority of the older analysis of vegetables the foundation of the process was the application of different solvents in succession. Ether, alcohol, and water were the solvents most commonly employed. In many cases, the residues were brought into contact with dilute acids and alkalies, after having been more or less exhausted with the three fluids mentioned, generally with the assistance of heat. In consequence of the facility with which many substances were transformed into others by the action of acids and alkalies in the heat, these latter methods of treatment often gave rise to incorrect views of the composition of the plants, or those parts under examination. The treatment of the substance to be examined in succession with ether, alcohol, and water, would have afforded much better results, as in fact was mostly the case when two conditions which did not prevent a complete separation in this way, were not sufficiently attended to and calculated upon. These conditions were the following: the exhaustion of the substance under examination with one fluid was always imperfectly effected before the second was allowed to act thereon. We cannot so prepare the material that each individual cell and its contents are exposed to the action of the solvent, because the material reduced to an impalpably fine powder, and exhausted with a solvent, affords again to the same solvent substances after it has been freshly triturated. Thus it happens that there are always bodies retained in the substance under examination after its treatment with a solvent which are soluble therein. If we now bring the substance in contact with the second solvent, the bodies not only will dissolve what we intend therewith to extract, but often also the remainder of the bodies which the first solvent left behind. The same holds good with regard to the third solvent. A solution of certain bodies by a solvent will afford thereby no means in many cases for the separation of other bodies which are insoluble in this solvent, because frequently substances which are *per se* insoluble in a liquid, are not insoluble in a solution of other substances in the same liquid. In this way we obtain, in a watery or alcoholic extract of a vegetable substance, bodies which *per se* are insoluble in water or alcohol, but which, by the agency of other bodies, are dissolved therein. Independently of these detrimental circumstances, which are produced by an incomplete exhaustion with one liquid before the application of a second solvent, there is associated the condition that the exhaustion with a liquid, at the same time, produces a solution of bodies which should not dissolve, because they are held to be insoluble therein. But what is termed insoluble are, in the majority of cases, only very difficultly soluble substances—that is, such substances as require a large quantity of the liquid when a little shall be dissolved therein. However, when it is desired to exhaust as much as possible a substance by means of a liquid, it is necessary to employ a large quantity of the liquid, as it is essential to effect the extraction with renewed portions of the liquid. In so great a quantity of liquid a quantity not inconsiderable of the very difficultly soluble bodies dissolve, which, by the concentration of the liquid, are often prevented from being separated by other constituents, and thus renders impure, in a serious degree, the substances which we wish to extract free from the other constituents.

The process for the analysis of plants, given in the following pages, depends on the treatment of materials with various solvents. Every resulting solution then undergoes a further appropriate treatment therein. It must be here mentioned that the preparation of some of these extracts, and their further investigation, promise no certainty, and that only by a comparison of the results which are obtained by the investigation of all the individual constituents, separately and collectively, we can deduce a correct conclusion on the constitution of vegetable substances.

It would have been, as every competent judge will concede, a perfectly unfruitful, useless labour, to publish, as far as it is known, the behaviour of all known constituents of plants with reagents; and more so, because we will not deceive ourselves or others that from the identical behaviour of two analogous bodies with some reagents

no conclusion can be drawn with regard to their identity. Only by identical composition, surely established by elementary analysis, the identity of reactions proves something; through the attempts at recognizing and detecting in a mixture of bodies the individual constituents by their behaviour with reagents without further corroboration, have arisen numberless false statements. Malic acid, gum, &c., are stated to have been found as constituents in numerous plants. Whoever has carefully tested these statements will find, by a repetition of the analysis, no malic acid, and convince himself that the supposed gum is a salt of an organic acid with an inorganic base, which possesses no remarkable taste, dries to a gum-like mass, dissolves in water, and is precipitated by alcohol therefrom in white flocks, &c. To prove that body, which has been obtained by analysis, is identical with an already known substance, the elementary analysis of this body, or one of its suitable combinations, must be undertaken. Only the reactions of substances rendered pure deserve in this respect consideration, not the reactions of mixtures. Without elementary analysis, in regard to identity, only a high degree of probability can be arrived at, but no certainty. But an error, in a high degree probable, is more dangerous than a palpable mistake. Elementary analyses, which alone bestow a value on the identity of reactions, are, besides, the least difficult and tedious part of the labour. They require no great amount of ability. This is only necessary for the preparation of the substance to be analyzed.

SECTION 1.—*Mechanical treatment of the material preliminary to its investigation.*

When we desire to be able to learn the composition of a vegetable substance, the first requisite is to simplify and facilitate the subsequent chemical operations by a suitable mechanical preparation of the substance to be examined.

If we were in a position so to dismember a plant that only its equally similar cells were separated and subjected to a chemical investigation, not only would the analysis be thereby greatly simplified, but a source of error would be quite removed—the formation of bodies not originally present by the action of the constituents of dissimilar cells on one another. But such an anatomical preparation of the material for the subsequent chemical investigation is an impossibility. Now, as the separation of the individual tissues of a plant with a large quantity of materials, such as we require for a chemical investigation, belongs to the limits of the impossible, we must accomplish at least the possible in this respect by the mechanical separation of the parts as completely as practicable. How far this can be effected in certain cases depends on the structure and anatomical relations of the substance to be examined.

To render the substance intended for examination suitable for treatment with liquids, it must be comminuted. The more points of contact presented by the material to the liquid, the better it is. The comminution cannot easily be carried too far with materials which cannot be penetrated with the liquid which is intended for their extraction. In this case merely moistening of the surface of the smallest portions takes place. The smaller these portions, the greater the surface, the more completely the extraction with the solvent is accomplished. With a material which is readily penetrated with the solvent employed, a careful comminution is superfluous. In so far as a substance swells up by means of the fluid used for its extraction, its minute division is objectionable. Under such circumstances a gelatinous mass results, which absorbs and retains much fluid, the solvent cannot be separated, and when pressure is employed for this purpose, the pasty mass escapes through all the pores of the press-cloth.

Frequently a very fine powder of the substance cannot be prepared on account of the peculiar tenacious property of the material. Nevertheless, if it be desirable to divide such a substance as much as possible, it may be often readily effected after the removal of the greatest part of several constituents.

Often a certain degree of moisture, the presence of water, renders the substance tenacious and elastic, so that it is difficult to pulverise it. A careful drying suffices in such cases to deprive the material of its tenacity, and to render it pulverizable. For example, it is extremely difficult to beat to a fine powder coffee beans in the condition in which they exist in commerce. However, this is easily effected when they are exposed for several days to a temperature between 140° and 150° Fahr., and

thereby rendered free from a portion of their hygroscopic water. The presence of a fatty oil oftentimes makes the substance to be examined tenacious; after the expression of the oil from the coarsely powdered material, the residue can then be finely divided.

When resins or fats in smaller quantities are the cause of the tenacity and elasticity, the comminution of substance may be effected by first removing, by a suitable solvent, the objectionable portion of the constituents from the coarsely-powdered substance, then drying it, when it can be finely divided.

The pulverization is always facilitated when it is accomplished by stamping or rubbing, by separating the coarser from the finer particles by means of a sieve, and repeating the operations on the coarser portion.

Whether a substance is to be reduced to a fine state of division by stamping, rubbing, rasping, cutting, or crushing between rollers, depends on its properties, and no instructions can be previously given here in this respect. The apparatus required for these operations are so well described in various works, and rendered intelligible by the aid of engravings, that it appears superfluous to enter more closely into this matter.

Before the pulverized material is treated with appropriate solvents, it is advisable in all cases to observe whether it is not possible by expression to completely separate certain constituents. In the investigation of vegetable substances which contain liquid fats, or fats fusible at a moderate temperature, a great portion of the fat may be separated by cold expression, or by plates heated to 212° Fahr. In the investigation, the advantage is not only thereby gained that a considerable quantity of fat is separated from the other constituents, but many other advantages are thus attained in the further treatment of the substance—for example, in its extraction with water as well as with alcohol, as the presence of a large quantity of fat occasions many inconveniences. The watery decoction, as well as the watery residue, which remains behind after the expulsion of the alcohol from the extract prepared with spirit, is rendered, with materials rich in fat, often turbid, and cannot be obtained clear by filtration. With such liquids the filtration proceeds with extreme slowness. This disadvantage is everywhere evident when saponine or analogous bodies are present in solutions, which the fat so finely divides and suspends in the liquid, that they pass through a moist filter simultaneously with the liquid. Even when the liquid has been obtained clear by filtration, its filtration is very much retarded thereby, and the opportunity to decompose is afforded to the dissolved substances. When a turbid fluid, containing fat, is mixed with a saline solution to produce a precipitate, the precipitate mechanically throws down the fat, becomes so pasty in consequence, and difficultly divisible in water, that its solution in acids, its decomposition by a current of gas, and by other agents, are very difficult to be accomplished. There often remains no other means for the separation of the fat than to precipitate a portion of the constituents, which are dissolved in the fatty liquid by a reagent, and then to filter the liquid. It is evident that by this method of separating the fat a portion of the other constituents are sacrificed. It is advisable to avoid such loss when it can be prevented.

SECTION 2.—*On the nature of the substance to be examined, and on the quantity required for its investigation.*

If we desire the investigation of one, several, or all the constituents of a plant, by means of analysis, we should endeavour to obtain the material for the investigation in the freshest condition possible. I have had occasion to convince myself that fresh vegetable substances, even when most carefully dried and preserved, do not contain even a trace of several bodies after some months which were easily detected in the first instance. It is often impossible to use the material in a fresh state for investigation. When plants or their constituents have to be examined which are brought from distant countries, we must be contented to obtain such things in the best possible state of preservation. But it may not be possible to draw with full certainty a conclusion from the composition of such materials with reference to their composition in all points in a fresh condition. Indeed, such investigations are calculated to afford very useful results in pharmacological, dietetic, or industrial relations, because the materials are employed in the same condition in which they are investigated; but they are not suitable for giving a representation of the true composition of the living

plant. Chemical changes often proceed by their preservation without observable external alterations, and, in consequence, the composition resulting from these changes is regarded as the original one. Consequently, when we are in a position to be able to select the material for the analysis of a plant, and not compelled to employ for the investigation vegetable substances which we cannot procure in a fresh state, it is always most convenient to select such plants or their constituents which can be obtained in a fresh condition, and to be able to undertake the investigation at places not far distant from where they grow. Only in these cases are we sure to obtain a correct result from a correct analysis; that is, to be able to learn the true composition of the living plant. Results are only obtained in this way, which, in vegetable physiology or botany, are truly trustworthy. It would appear, from what has been stated, that the field of activity is a circumscribed one; but this is not so. We know the composition of plants which grow in our immediate neighbourhood less than in many others. The tree under whose shadow we walk, as well as the vegetable we tread upon in our path, are chemically unknown things. We know the salicine of the willow and the populine of the poplar, we know the amygdaline of the almond and the volatile oils of the camomile and the sage, but a representation of the composition of those plants we have not. He who knows the composition of oil of valerian knows nothing of the composition of the plant which produces it. We know infinitely more of the cinchona-tree and other exotic plants than of the lime and nut trees of our own woods. If all chemists were to occupy themselves with the analyses of plants, after several centuries there would be still materials enough growing before their eyes to employ hundreds of hands with their chemical investigation.

The investigations which spread the most light are those which enable us to learn the composition of the individual parts of a plant at different periods of its growth, and at different epochs of its development. The material for such investigations can scarcely be procured at a distance, so we are constrained to consider that which lies near us and not afar off, to seek that which is better and easier obtained at home.

With regard to the quantity of material required for the investigation, no certain weight or measure as a minimum can be fixed. But it is better in all cases to employ too much, rather than too little, material. With materials which cannot be procured in any required or unlimited quantity, it is better to commence no analysis. Through a scarcity of material the operator is constrained to terminate the research, unable to complete it, and has time and money uselessly spent, or arrives at incorrect results, when, from a failure of the material, he is unable to undertake a number of control experiments. It is on that account that the results of analyses which, as frequently happens, were undertaken with a few ounces of the material, seldom possess any value. In the best instances of such analyses some constituents were overlooked which were present in small quantities in the material. Many incorrect statements were not perceived in such analyses because an insufficient number of methods of separation were employed. Mixtures of bodies were regarded as new substances, and were long carried on as the ballast of science, until later analyses proved their non-existence. Substances which are widely different from one another were confounded with each other, because an insufficiency of material was employed to prepare enough of the constituent to establish its composition in the pure state. Thus, one chemist finds tartaric acid, when another is stated to have found oxalic acid, and a third seeks unsuccessfully for tartaric acid, and finds instead citric acid. If we could previously determine the quantity of material, it is often useful not to make such a previous determination. The operator can easily ascertain how much water or dry substance a material contains; and when it is very rich in water, concludes therefrom that he will require proportionately more of it than from one poor in water under other similar conditions. But from the abundance of dry substance, no conclusion can be drawn as to the quantity which will be required for the investigation. Many parts of plants contain large quantities of cellulose, starch, and other ordinary constituents, which may be readily detected, but the remaining constituents are very difficult to discover. Frequently all the constituents are present in rather considerable quantities, so that the investigation can be terminated with a little material, unless one constituent is present in very small quantity. In such case a very great mass of the material must be operated upon to obtain a constituent which is present in small quantity, because from a smaller

quantity of the material we cannot obtain enough to arrive at a conclusion upon its nature by a suitable research. If we abstract from the weight of a substance under examination the weight of water which it contains, also that of the inorganic constituents and the weight of cellulose which remains after the material has been treated with ether, alcohol, water, dilute acids, and alkalies, we obtain an inconsiderable residue, which represents all the other bodies together present, except the cellulose, water, and inorganic constituents. As a general rule, we seldom find more than 300 grains of these bodies in from 3lbs. to 5lbs. of the crude material, which must be subjected to a close investigation if we would arrive at a correct view of their true nature. From this general estimate, it will be seen that 5lbs. of crude material is a quantity that scarcely is sufficient at any time for the completion of an analysis. The least quantity of material is required in those cases where the known, easily recognized constituents are in the smaller quantity, and the unknown ones, on the contrary, are in the greater quantity.

(*To be Continued.*)

NOTE ON A POISONOUS *LORANTHACEA.*

BY J. LÉON SOUBEIRAN.

Plants of the order *Loranthaceæ* are characterized in general by the presence of an astringent principle, which in India has led to their employment in dyeing black, and which in some countries has gained for them a reputation in medicine. Moreover, they contain wax, gum, chlorophyl, saline matter, an insoluble viscous matter and a peculiar substance, bird-lime, from which Macaire has extracted the principle called *Viscine.* Many of these plants are employed medicinally in Brazil, Java, India, &c. In Brazil several medicinal *Loranthaceæ* are designated by the name *Erva de Passerinho.* The bruised leaves and shoots of *Struthanthus citricola* Mart., mixed with oil, are used with advantage in œdematous tumours. In India the leaves and shoots of *Elythranthe globosa* Blume, *Macrosolen elasticus* Blume, and *Dendrophthoë longiflora* Blume, are employed in analogous cases; only that the oil is replaced by a mucilage, of which rice is a constituent. *Dendrophthoë bicolor* Mart., is used in India as one of the best antisiphilitics. According to Auguste de Saint-Hilaire, the leaves of *Loranthus rotundifolius*, boiled with sugar and milk, are administered by the Brazilians in chest complaints. In many countries mistletoes are regarded as a panacea, so that we need not be astonished that, after the manner of our ancient druids, the Javanese worship the pagoda fig-tree (*Ficus elastica*) on which these parasites grow.

It would be an interesting study, we think, to examine if the variety of action of these *Loranthaceæ*, that is in the cases in which they are really as efficacious as is alleged, does not depend upon that of the plants upon which they are parasitic. This hypothesis is confirmed by observation, at least so far as the instance we are about to relate enables us to judge.

M. Lépine, the distinguished *Pharmacien de la Marine* at Pondichery, has forwarded, among other interesting substances, to the Musée de la Marine et des Colonies, a substance under the name of *Poulourivi*, consisting of the stalks and leaves of a species of *Loranthus*, botanically undetermined, which grows on the lower hills of the Nilgherries, and which occurs as a parasite upon the branches of *Strychnos Nux-vomica.* According to M. Lépine, the parasite possesses the same poisonous properties as the plant upon which it grows, and from this cause has even occasioned serious accidents. So long ago as 1837, Dr. O'Shaughnessy received specimens of *Viscum monoicum*, collected at Cuttack, and also found growing upon *Strychnos Nux-vomica*; and with this *Viscum* in small doses he was able to poison dogs [as with Nux-vomica].

Of the *Loranthus* received from M. Lépine we have taken 6.50 grammes, which treated with alcohol have afforded .60 centigrammes of dry extract. Birds, as chaffinches and goldfinches, and frogs, to whom small quantities of this dry extract have been given, have speedily exhibited the convulsive and tetanic symptoms characteristic of strychnine or brucine, and have succumbed in from ten to fifteen minutes.

The very small amount of the substance at our disposal has not admitted of our

making a complete analysis; but the nature of the phenomena produced upon the animals subjected to experiment, and the bright red colour, as remarked by M. Lépine, which the wood of the *Loranthus* acquires under the action of nitric acid, leave scarcely any doubt as to the cause of the effects of this plant. We hope at a future time to be able to resume these experiments, and so complete what we are now obliged to leave undetermined.—*Journ. de Pharmacie et de Chimie*, Feb. 1860.

PREPARATION OF VALERIANATE OF AMMONIA IN DRY CRYSTALS.

BY BENJAMIN J. CREW.

Having experienced, along with many others, considerable difficulty in obtaining crystallized Valerianate of Ammonia in quantity, by any of the published formulæ, I was induced to make a series of experiments, which, having been entirely successful, I am willing to make public for the benefit of other operators.

The first step in the preparation of this salt is to procure the *monohydrated valerianic acid*, or the *oily inflammable acid*. The terhydrated acid will not produce crystals under any circumstances, or with any amount of manipulation; a very dense solution may be had, but it will not crystallize, even if the temperature be reduced to zero. To procure the monohydrated acid, take of valerianate of soda a convenient quantity, say 5lbs., boiling water just sufficient to dissolve, strain the solution through muslin, if necessary, and add oil of vitriol by degrees until no further action is induced, or until the valerianate of soda is entirely decomposed. Allow the mixture to stand a short time, that the valerianic acid may rise to the surface and separate into a distinct layer, which may be drawn off with a syphon, separating funnel, or pipette. This acid (which still contains sufficient water to prevent perfect crystallization) should be poured into a cylindrical jar, and treated with a small portion of oil of vitriol and agitated by inserting a tube through the acid and blowing with the mouth; the passage and regurgitation of the air bubbles mixes the whole thoroughly; allow the mixture to stand a few minutes; the oil of vitriol seizes the water and subsides with it. Now test with a hydrometer the supernatant acid, and should it mark sp. gr. of .950, this part of the process is complete; if above this, add a second portion of oil of vitriol, which should bring it to this degree of strength. The acid, after thorough subsidence may now be drawn off by either of the processes above indicated. As thus prepared it is somewhat coloured, contains a small portion of sulphuric acid, and also a portion of water. From these impurities it is freed by distillation from a glass retort. In this process there are a few points to be attended to upon which perfect success must depend. The distillate should be received into a hydrometer jar, and each portion tested with a hydrometer. The first portion that comes over contains considerable water, and must be rejected and laid aside for further manipulation; when the distillate marks .940 it may be retained. The distillation is now proceeded with, producing a portion of acid of .930, until white vapours appear in the retort, when the gas flame is immediately withdrawn. The portion coming over first should be treated with oil of vitriol, the water abstracted and added to the retort and the operation finished with care. The mixed distillates indicate a sp. gr. of about .933, perfectly clear, colourless, and of high refractive power. When thrown into water, it rises immediately to the surface, floating like an oil, burns with a blue flame, and acts with much energy upon the tongue and lips, producing a white spot and destroying the cuticle. The next stage of the process is far more simple and easy of execution, and consists in the saturation of the acid with dry gaseous ammonia, prepared by heating, in a suitable vessel, hydrate of lime and muriate of ammonia, in proper proportions, and passing the gas through a bottle containing fragments of quick lime. Ammonia is passed in until litmus paper is not acted on. No attention is paid to keeping the acid cool. The temperature rises to about 150°, keeping the liquid thin, and thus preventing the stoppage of the tube with crystals. It should then be set aside to crystallize. In a few hours it becomes nearly or quite solid. If necessary, the crystals may be thrown upon a funnel, and allowed to drain, and finally laid upon bibulous paper. As thus prepared, they are perfectly snow-white, perfectly dry, and not deliquescent. Some specimens exposed to the air for several days appeared to effloresce.—*American Journal of Pharmacy.*

Philadelphia, 1*st mo.* 16, 1860.

ON POLYGALIC ACID.

BY WILLIAM PROCTER, JUN.

Seneka snake root, s one of the most efficient American contributions to the Materia Medica, early attracted the attention of European pharmaceutists and chemists, and at least half a dozen analyses of it had been published more than twenty years ago, when it was very fully investigated by Quevenne (*Jour. de Pharm.*, 1836, p. 449) in his inaugural essay sustained at the School of Pharmacy at Paris.

According to this analysis the constituents of seneka are as follows, viz. :—

ORGANIC.	INORGANIC.
Polygalic acid,	Carbonate, Phosphate, and Sulphate of Potassa,
Virgineic acid,	Chloride of Potassium,
Pectic acid,	Carbonate, Sulphate, and Phosphate of Lime,
Tannic acid,	Alumina, Magnesia, Silica, and Iron.
Bitter yellow colouring matter,	
Gum, Albumen, &c.,	
Cerin, and fixed oil.	

Polygalic acid, so called by Quevenne, was previously made known in a less pure state, as *senegin*, by Gehlin. It is the active constituent of the root, although some influence may be due to the virgineic acid and colouring principle. It may also be noticed that both Dulong and Foenuille found malic acid in this root, united with lime and potassa.

It may not be out of place to state the characteristics of this substance, as it is certainly deserving of a better destiny than has thus far been accorded to it. Polygalic acid is a white amorphous powder, without any tendency to crystallize, and is unalterable in the air. It is inodorous when pure, but is apt to retain traces of virgineic acid. Its taste, at first but slight, soon becomes pungent and acrid, and produces a painful constriction of the throat. When its dust is inhaled through the nostrils, irritation and violent sneezing occur. It is not volatile ; when burnt in a tube it affords no nitrogen, and is wholly combustible. Polygalic dissolves slowly in cold water, but readily in hot water, forming a solution which reddens litmus paper, and froths strongly by agitation. It is soluble in boiling alcohol, but the larger part separates on cooling. It is soluble in diluted alcohol, but the solution has a tendency to deposit it on standing. It is absolutely insoluble in ether, and in acetic ether, the fixed and volatile oils. It is soluble in alkaline solutions, with the production of a greenish yellow colouration. It is precipitated in its free state by subacetate of lead, and proto-nitrate of mercury, but by no other salts; various salts throw it down from solution when it is combined with an excess of potassa or soda. When heated with nitric acid it affords oxalic and picric acids, and sulphuric acid decomposes it with a rose and violet colour. The acid character of this substance is so slight that it will not decompose the carbonates, yet it forms amorphous salts with alkaline and metallic bases. Quevenne suspected a close relationship between polygalic acid and saponin. More recently (*Annal. der Chemie*, and *Amer. Jour. Pharm.*, vol. xxvii., 43), M. Bolley has resumed the inquiry, and believes that both saponin and polygalic acid are glucosides, like salicin, resolved by hydrochloric acid into sugar and a derivative body *sapogenin*, and that their formula is the same.

Preparation of Polygalic Acid.—The particular object of this paper is the preparation and administration of this substance. The original process of Quevenne required precipitation by acetate of lead, and the action of sulphuretted hydrogen; but he afterwards greatly simplified the process, but retained some complications not necessary to obtain the acid sufficiently pure for medicinal use. The following process I have tried several times, and it has the merit of great simplicity:—

Take of Senega, in powder (50 meshes to the inch), 10,000 grs.
Alcohol,
Ether, and water, each, a sufficient quantity.

Moisten the senega with half a pint of a mixture of two parts of alcohol and one part of water, pack it in a large glass funnel; cover the surface with a piece of muslin, or paper, and pour on the same liquid until three pints have slowly passed by drops,

or until the root is nearly exhausted. Evaporate this tincture to twelve fluid ounces, which removes nearly the whole of the alcohol, and then agitate it with repeated portions of ether, until the latter ceases to acquire colour, decanting each portion before adding the next, which requires about a pint and a half. The syrupy liquid is now mixed with a pint and a half of strong alcohol, and half a pint of ether, well agitated several times and set aside to repose. The polygalic acid being nearly insoluble in this menstruum, precipitates as a bulky light fawn-coloured precipitate. If, on adding a small portion of the clear liquid to a similar mixture of ether and alcohol, no precipitate occurs, the whole of the polygalic acid capable of being thus thrown down has been separated. The supernatant liquid is now carefully decanted from the precipitate, which is thrown on to a filter and carefully washed with a mixtue of two parts of alcohol and one of ether, till the adhering coloured liquid has all been displaced. The filter is then spread on an absorbent surface of paper, pressed strongly, the mass broken into small fragments, dried and powdered. The resulting powder weighs 550 grains, $5\frac{1}{2}$ per cent. of the weight of the senega; making allowance for wastage, senega may be said to contain one-sixteenth of its weight of this substance, and consequently thirty grains will equal an ounce of the root.

In this state polygalic acid is not pure, but is sufficiently so for all medical purposes. It retains traces of colouring matter, and of some substances which are separated by the ether, but in very small amount. By redissolving it in hot water, and precipitating with the mixture of ether and alcohol, and afterwards dissolving it in hot alcohol, with animal charcoal, and filtering hot, it is obtained quite white.

The ethereal washing liquids first obtained were evaporated till no ether remained. The residue consisted of a dark amber-coloured fixed oil, admixed with crystals of virgineic acid, which formed a crust on its surface, and a dense aqueous solution of the same acid, which strongly affected litmus paper.

The liquid from which the polygalic acid precipitated was allowed to stand a month, when the sides and bottom of the vessel were spangled with a crystalline matter in small quantity. This substance is soluble in water, when heated; less soluble in alcohol; gritty between the teeth; has no taste of senega; fuses by heat, blackens, and is almost entirely consumed. Concentrated SO_3 dissolves it with heat without the evolution of either ammonia or HCl. Its aqueous solution is not precipitated by either chloride if barium or nitrate of silver. A crystal placed on moistened litmus paper produced a reddish spot. It is possible that this substance is an acid salt of malic or some analogous acid. The small quantity of ash it leaves is alkaline. The investigation was not pushed further.

The liquid, from which the crystals deposited, by evaporation yielded an extract tasting strongly of senega.

As regards the pharmaceutical applications of polygalic acid, several experiments were made :—

1. Five grains of the acid in a fluid ounce of water, kept in a phial for two months, acquired a fœtid odour, whilst a portion of matter precipitated, yet the taste of the solution was strongly that of senega.

2. Five grains of the acid were dissolved in an ounce of cold water, with five grains of bicarbonate of potassa, and kept the same length of time. This solution also spoiled, but retained its senega taste.

The best form of prescribing polygalic acid, in liquid form, is with syrup of gum-arabic, to blunt its acrimony. It is necessary to dissolve it in a little hot water, and add it warm to the syrup of gum, and mix them. It may also be added to syrup of ipecacuanha to increase its expectorant power. But the form best adapted to administer this principle is in pills and powders. In doses of one or two grains (which represent 15 to 30 grains of senega) the full effect of a table-spoonful and a fluid ounce of decoction of senega is obtained. Where a more gentle effect is desired, the dose must of course be greatly reduced, to $\frac{1}{2}$ or $\frac{1}{4}$ of a grain, and can be associated with ipecac, tartar emetic, and other medicine with which senega is given. When the form of powders is adopted, a mixture of powdered gum and sugar should always be added to blunt the acrimony of the polygalic acid. Sugar of milk triturated with the acid, in the proportion of 1 grain to 9 grains, is an eligible form for use.

In cough mixtures, when not contra-indicated or incompatible, the addition of an equal weight of bicarbonate of potassa faciliates its solution. It is not advisable to keep a permanent liquid preparation of polygalic acid, leaving that form for the

officinal syrup, but it undoubtedly offers an admirable means of using senega in the forms above indicated, when the physician can regulate the dose and associate it with other remedies in the nicest manner.—*Proc. Am. Pharm. Association*, 1859.

ARSENIC SUBLIMATES.

BY FREDERICK W. GRIFFIN, PH. D.

While acknowledging the ingenious character of many of Dr. Guy's adaptations, as described in his paper read before the Society of Arts, I must altogether demur to the proposed employment of flat discs of glass for receiving arsenical crusts. Except with very high magnifying powers (which are rendered unnecessary by adopting a process which I shall presently describe) a glass tube of half an inch diameter offers equal facilities for examination under the microscope. Indeed, for small crystals, even a quarter-inch objective (magnifying 500 diameters) can be so employed, with the slight drawback of needing some extra focusing. On the other hand, the rapid sublimation required in Dr. Guy's method must involve the loss of part of the arsenical vapour at the mouth of the tube, which is only loosely covered by the flat glass, and another portion, being very dense, will remain in the tube itself, whilst that which reaches the disc will be deposited on it in a nearly amorphous condition. No wonder that such "mists" should frequently require objectives of one-eighth inch to develop any crystallic character, and even then a few imperfect triangular facets afford but unsatisfactory evidence of *octohedralism* when we consider what weighty issues are in a measure dependent on the making out that feature. It is, however, in the power of the operator to obtain crystals of arsenious acid as perfect as he can those of alum an inch or two in diameter, and by acting on the same principle, namely, by obtaining a very gradual formation during slow cooling. The following is the *modus operandi*, as described in Table I. of my "Compendium of Qualitative Analysis." Drive the substance entirely off the lower half of the tube, which is made very hot by waving it about in the flame. Then revaporize the sublimate, holding the tube (which should be closed by a loosely-fitting cork) as upright as possible. The dense vapour sinks to the bottom, and will give large and regular crystals as the glass slowly cools. These crystals glitter in the sun like diamonds, and exhibit the same play of colours: they are from one one-hundred-and-fiftieth to one two-hundredth of an inch in diameter, and under an inch objective form splendid specimens for the micro-crystallographer. Here and there we find octohedra absolutely perfect, but they are more frequently truncated; all the angles, however, being beautifully sharp. The majority are transparent, but some are only translucent, or even opaque. By reflected light (using a bull's-eye condenser) they appear, in consequence of their adamantine lustre, like diamonds lying in high relief on a black ground; but their complete shape is most strikingly displayed by a combination of strong reflected and feebler transmitted rays of various degrees of obliquity. A tube of half an inch diameter, under a one-inch objective, presents nearly the entire field in focus, and the perfect crystals appear from one-half to three-quarters of an inch in diameter.

As regards the statement that arsenious acid sometimes assumes the cubic form, I would venture to suggest that Dr. Guy may possibly have been deceived by a hasty examination. An octohedron, if opaque and seen only by transmitted light, often appears a cube, since, when viewed perpendicularly to either axis, its section or outline is square. I may mention as a parallel case, that I have obtained crystals of hydrate of chlorine full a tenth of an inch in diameter, which, for the most part, seemed to be perfect rhombs (the angles were 110° and 70°), but closer observation convinced me that Faraday's description of them as "acute flattened octohedra with three unequal axes" (*i. e.* rhombic octohedra) was really correct. Such misapprehensions are very likely to occur under high magnifying powers.

I will describe an actual experiment which will show that my method is as applicable to minute quantities as Dr. Guy's, while it is far more conclusive in its results. Dr. Guy states that a thousandth of a grain of arsenious acid yielded on sublimation a "circular mist consisting of brilliant detached points distributed evenly over the surface (of a disc) and easily resolved into octohedra under *an eighth* power of the microscope." By way of comparison, I accurately weighed out a grain of pure arsenious acid on a balance sensible to the thousandth of a grain. I dis-

solved this in water, and made up to a known bulk. By means of a graduated pipette I took a thousandth part of this, containing, of course, a thousandth of a grain of arsenious acid, and evaporated it to dryness on a bit of curved glass. The latter, with the slight residue adhering to it, was then cut up and placed in a corked tube, four inches long by four-tenths of an inch in diameter. On igniting the fragments, a feeble sublimate appeared half way up the tube, which, under a quarter-inch objective, was seen to consist of granules, evidently crystalline, but of indeterminable shape, and not more than one ten-thousandth of an inch in size. Resublimed by my method, these gave a few octohedra, which were sought out by the inch objective, and then examined under the quarter-inch. They were beautifully perfect in shape, and about one twelve-hundredth of an inch in diameter. This alone would yield the strongest presumptive evidence of the nature of the substance in question, but I can by no means agree with one of the speakers at the meeting (Dr. Thudichum), who considered that we might afford to neglect applying the liquid tests to a solution of the sublimate. Each reaction must stand for what it is worth, but the concurrence of many furnishes proof the most irrefragable. The above quantity seems to be about the smallest that would yield any definite result in a tube of the size named; but unless much more than a thousandth of a grain of arsenious acid were obtained by Reinsch's test, I, for one, should be extremely loth to assert that it had been criminally administered. Indeed, I fear that the detection of this particular poison has reached an almost dangerous degree of delicacy, for we live surrounded by means of unconsciously absorbing traces of arsenic. We breathe arsenicated dust from the green flock papers on our walls; arsenical *papier Moure* lies soaking on dishes afterwards used for culinary purposes; arsenic is contained in glazed green papers which are often employed for wrapping cocoa and other articles of food, and confectioners supply it wholesale in their cake-ornaments. The very drugs prescribed for our relief, especially the compounds of bismuth, are tainted with arsenic, and it has even been detected in carbonate of soda. Nay, more, our vegetable food, as Professor Davy has lately pointed out, may be contaminated with arsenic derived from superphosphate-manure, and there is probably no drinking-water containing iron without a trace of arsenic as well. Now, metals are remarkably prone to become localized in particular organs; the "dropped joints" of painters are found to contain lead permanently combined with the tissue; and a course of iodide of potassium will bring off abundance of mercury by the urine, years after its administration. It would appear by no means improbable that traces of arsenic occasionally introduced into the system, may be stored up in like manner (especially in the liver), till in the course of years the amount becomes appreciable. Many aquatic plants contain much iodine, all gradually absorbed from the water in which they live, though it cannot be detected therein from the minuteness of its quantity; the vegetable tissue, however, accumulates it and retains it persistently. So may it be with arsenic in the human body; and I think toxicologists should pause before affirming that it had been criminally administered, unless a proportionate amount of the poison is found.

Bristol School of Chemistry, April 23, 1860.

WEAVING BY ELECTRO-MAGNETISM.

(*Condensed from the Times of April* 12*th.*)

In the improvement of the old weaving machine, effected by Jacquard, under the encouragement of the First Napoleon, the pattern of the design was pricked on large perforated cards, which went in an endless chain round a roller in the centre of the loom. All the threads of the warp were connected with bars in the upper part of the loom, and these, by a movement of the weaver's treadle, were pushed against the perforated cards. Those which faced the pattern holes, and therefore corresponded with them, remained there, and so, when the lever was lowered, held up the threads which ought to have been raised, and allowed the shuttle to weave in the weft or pattern between.

This machine was an immense improvement on the old affair, yet, though always continuing the best, it had its own peculiar drawbacks. Thus, a pattern for a damask curtain or tablecloth of a rich or elaborate design, we will say, required from 20,000 to 25,000 cards! To produce these occupied men from two to four, six,

or even eight months, according to the greater or less intricacy of the design, and cost from 120*l.* to 160*l.* As a matter of course, therefore, designs were made as simple and plain as possible, were not often changed, and never until the trade would no longer take them.

M. Bonelli at once sets aside all this, by the use of electricity. The little bobbins or bars which hold up the threads of the warp in the Jacquard loom he makes into electro-magnets in the usual way. The design is painted on a sheet of tinfoil, with the portions not used in the pattern covered with a non-conducting varnish. The pattern passes slowly over a roller under an immense number of brass teeth, communicating by fine insulated wires with the bobbins, the pattern, of course, being in connexion with one pole of a battery, and the bobbins, or magnets, with the other. Thus, as the tinfoil slowly moves round, the parts which are not to be worked, being covered with a non-conducting varnish, transmit no current through the brass teeth to the bobbins. The pattern, or exposed portion of the tinfoil, on the contrary, does so, and transforms the bobbins into electro-magnets, which attract and hold the bars opposite their points attached to the threads of the warp, which, as the lever descends, the bars are thus held up for the instant, and, of course, raising their threads below, and allowing the shuttle to be passed between.

This is merely a very rough and general outline of the old and new plans. The latter, however, is far too important to be thus disposed of in a few words. What we have already said will, nevertheless, assist our readers to comprehend the details of this most valuable improvement. The electric loom, as it is termed, was invented in 1854 by the Chevalier Bonelli, of Milan, and director of the Sardinian telegraphs. The first machine, constructed at Turin, was afterwards modified by M. Hipp, at Berne, and though it demonstrated the possibility of weaving by means of electro-magnetism, it, nevertheless, left much to be desired with respect to the success of its practical application. It was not until 1859 that success in perfecting the machinery and in rendering it available for either hand or power-loom weaving was attained. To fully appreciate all the advantages which this application of electricity to the manufacture of woven material must produce, it is necessary always to keep in mind the long and costly operations which, as we have said, are now incurred before commencing weaving in one or two colours.

Firstly, then, in weaving by the old machine we must remember the design is drawn on paper divided into a multitude of little squares, the horizontal series representing the weft, or pattern; the cross or short series, the warp, or substance of the material woven. Secondly, the design must be "read,"—that is, the punches of the stamping machine, which are equal in number to the small squares of the pattern, must be arranged so as to perforate the cards, which, as we have shown, form the basis of the present Jacquard system. Each of these operations must be repeated as many times as there are horizontal lines in the design (which merely represents one thread of the weft), as there must be as many cards as there are wefts or cross-threads in a pattern. Lastly, all the cards must be sewn together in the order of their succession. We have already shown how in the "Jacquard" these pierced cards act on the pins of the loom, and determine the raising of the threads of the warp or basis of the material beneath. M. Bonelli's looms instantly accomplish all this work we have been describing with an exactitude that could never be obtained from the "cards," which, as our readers will easily understand, were almost incapable of producing a very complex pattern. It is by passing the thread of the weft over or under the thread of the warp that the design, either in one or many colours, is produced. The design in M. Bonelli's plan is traced on a sheet of tinfoil, the pattern remaining in bright metal, while all the rest is painted over with a non-conducting varnish. The metal pattern thus becomes the conductor of the electricity, the varnished portions do not. This thin sheet of tinfoil is placed on a roller, which revolves it by very slow degrees, with a uniform movement, under a metallic comb. This comb contains teeth equal in number to the pins of a Jacquard loom (from 400 to 600), each of which is most carefully insulated from the next, and each connected by a fine wire with a small electro-magnet or bobbin. A wire from a small Bunsen pile is connected with this comb and electro-magnets, the other wire with the tinfoil design. When by the ordinary movement of the Jacquard loom, effected by the foot of the workman pressing the treadles, the loom moves, the metallic comb lowers itself, and comes in contact with the tinfoil sheet of the design. The teeth of the

comb touching on the varnished portions of course stop the passage of an electric current to the bars with which they communicate, and which, in fact, therefore remain mere bobbins. All those, on the contrary, which touch the metallic parts of the sheet (the design, in fact), allow the current to pass to the electro-magnets, which instantly become active and capable of attracting little horizontal bars of iron, which are arranged with their points towards the magnets in a frame common to them all. Those magnets, therefore, which are active at once attract and retain the bars as the frame, all by a simple movement, in a second moves a little back and lowers, and thus the threads of the warp below, which are attached to crochet-needles hanging on to the magnetized bars, are raised, and the shuttle with the weft of the pattern thread passed in between them.

There is a little mechanical contrivance employed to give solidity to the arrangement of the bars—a solidity which is necessary, as the magnetized bars have to act upon the needles of the loom, and keep them and their threads suspended. Such are the chief features of this electro-magnetic weaving machine, which, apart from its scientific merits, contains, in addition, some most admirable mechanical contrivances. Such, for instance, is the ingenious means by which the design sheet moves with a speed variable at will, and either backwards or forwards, and the addition of a little brush to clean the comb. This last, at each motion of the loom, sweeps across all its teeth to prevent the injurious action of the dust, which falling upon the surface would soon interfere with the action of the electric fluid. The loom which we have now described is only applicable to stuffs of two colours—that is to say, of one colour upon one general ground. But a loom capable of weaving stuffs of six, eight, or ten colours, only differs by the addition of a most simple piece of mechanism, thus:—Each of the different colours is insulated from the other, and along them on the pattern the pole of the battery slowly passes as the weaver works the machine with his feet, transmitting the current to each colour in the order in which they occur.

Thus, of course, the current is sent through the comb to the electro-magnets, which raise the threads of the warp below, where the weaver has his colour shuttles arranged in the order in which they are to be used, and throws them in accordingly. So the loom just as easily, and on the same principle, transmits the pattern to a stuff of twelve colours as to that of only two. It is in this that the weaving by electricity displays its superiority over the present system, according to which, for example, if a material is to be worked in six colours, it is necessary by the Jacquard loom to employ six times more cards than for a similar design of one colour. The advantages, therefore, which ought to result from the introduction of the electro-magnetic loom in the manufacture of all our patterned fabrics are sufficiently apparent. A new method, which does away with all the operations necessary to the preparation of the cards, must, of course, produce an all-important saving of both time and money upon the present system of manufacture. But there are other and not unimportant advantages, such, for instance, as permitting all manufacturers to try the effect of new patterns without going through the long and costly process of preparing cards. He can ascertain in a few hours the effect of any design, and prepare a series of specimens for the approbation of the trade before commencing upon a single yard of stuff. In short, whatever can be done by printing, lithographing, or engraving, can be thus stamped on tinfoil and reproduced in coloured silks, according to the colours of the original, with all the fidelity of an Elkington electrotype.

By this means, at a trifling cost, families can have special designs, such as crests and initials, for carpeting, curtains, furniture covers, &c., at a week's notice. In this loom also the workman is enabled with the greatest facility to effect a reduction of the design by means of varying the speed of the cylinder on which the pattern is placed. Without alteration or without touching the design, it can with equal facility make stuffs more or less strong or more or less light, by changing the number of the threads of the weft, and by regulating, in accordance with that change, the speed of the cylinder on which the pattern revolves. Of course any required additional effect can be made, or any part omitted from the design, without at all interfering with the workman. As a matter of course, the electrical portions of the invention are capable of application to any loom, and, in fact, occupy at the top of the machine no more space than a small writing-desk. It is only the cards

and cumbrous accessories of the Jacquard loom which are done away with; its mechanical properties are retained, and the electro-magnets can be applied to any. It is expected that with this machine, in all very large or intricate patterns, such as are now occasionally used in silks, a saving of £80. per cent. in money, and more than 80 per cent. in time, will be gained upon the production of similar designs by the present system.

The loom has been set up in one of the rooms of the Electric Telegraph station, Founders' Court, Lothbury, where it is daily at work for those who obtain permission to inspect it.

MISCELLANEA.

Lord Dundonald as a Chemist.—These were the days of Cavendish and Priestley, Black and Watt; and Lord Dundonald, whose patrimony had almost evaporated under a succession of losses incurred in the support of one generation of Stuarts after another, conceived the idea of recovering his fortune by turning the discoveries of modern science to practical account. He accordingly embarked, without much acquaintance with the details of business, into numerous speculations, most of which, as far as he was concerned, proved to be failures. He prepared soda from salt as a substitute for barilla, at that time the only alkali available for soap and glass making. He set about the improvement of alumina as a mordant for silk and calico printers. He manufactured British gum to displace gum Senegal for the use of calico printers. He had another manufactory for sal ammoniac. He had a new process for the production of white lead, in a sixth establishment he spent his energies on coal, from which he obtained coke for the ironfounders and tar for ships. In those days copper sheathing was almost unknown, and the chief defence against worms was to drive large-headed iron nails into the whole of the ship's bottom, which had thus the appearance of being hob-nailed—a protection, however, which was given only to superior vessels, the smaller ones being entirely at the mercy of the worm. Having observed while he was in the navy the ravages made on ships' bottoms in this way, it occurred to Lord Dundonald, as a chemist, that an extract from pitcoal in the form of tar might be a preventive. He made the experiment, was successful, saw his invention adopted by the Dutch, and more tardily in our own coasting craft; but could not prevail on the Admiralty, who about this time were beginning to think of coppering, to second his views and give him its patronage. In his coal experiments he eliminated gas, and conducting it through a gun barrel, produced a flame which blazed forth in an unmistakable manner; but he did not turn this experience to further account. He passed on to new investigations. In 1795 he published a *Treatise showing the intimate Connexion between Agriculture and Chemistry*, in which he has made good his title to be regarded as the father of agricultural chemistry, and in which, to come to particulars, he has recommended three processes, for the authorship of which later writers have contended—the malting of grain for the food of cattle, the converting of peat moss into good soil, and the use of salt refuse in the way of manure, this last suggestion having been advanced by him at least ten years before. It is impossible to enumerate all his schemes, and we shall therefore only mention one more—an improved mode of preparing hemp and flax for the manufacture of sailcloth. So flimsy were the materials of which sails were composed, that our author says he has taken an observation of the sun through the foretopsail, and brought it to a horizon through the foresail; and the Admiralty, seeing the advantages of the new invention, ordained that in all their contracts hemp should be steeped and boiled after the manner explained in Lord Dundonald's patent. Unfortunately, all his Lordship's fertility of invention could not make his schemes successful from a pecuniary point of view. He had too many irons in the fire. His inventions fell into other hands; some were sold, others were pirated; and this ingenious, active, fertile thinker found himself, with seven children to provide for, a ruined man.—*Times*, April 5th.

Combustibility of Tobacco.—At the last sitting of the French Academy of Sciences, M. Schlæssing communicated his researches on the combustibility of tobacco, meaning thereby the length of time the leaf will remain in ignition after each inspiration of smoke. It appears from his statements:—1. That the soluble parts of the ashes of a combustible kind of tobacco always contain carbonate of potassa (no soda), and that, in general, the more combustible tobacco is the greater is the

alcalinity of its ashes. 2. That the soluble parts of the ashes of an incombustible kind of tobacco do not contain any carbonate of potassa, but most frequently lime. 3. That an incombustible kind becomes the reverse when incorporated with an organic salt of potassa, such as the malate, the citrate, the oxalate, the tartrate, &c., in a certain proportion. 4. That a combustible kind of tobacco becomes incombustible when incorporated with a mineral salt (a sulphate or chloride) of lime, magnesia, ammonia, &c., in a certain proportion.

New Species of Honey Bee.—At a meeting of the Apiarian Society, held at the house of the Entomological Society, 12, Bedford Row, the secretary, Mr. Tegetmeler, described the successful introduction into this country of the *Apis Ligustica*, or Ligurian bee, a distinct species from the ordinary honey bee. It is regarded as of great value, as an abundant honey collector, and has been recently introduced into Germany with great success. Colonies of the new species were stated to be at work in the apiary of the society, Muswell Hill, and also in Devonshire.

Preservative Fluid.—Dr. Passini recommends the following as an antiseptic mixture for the preservation of blood-globules, nerves, ganglions, the retina, and the white tissues generally:—Protochloride of mercury, 1 part; chloride of sodium, 2 parts; glycerine, 13 parts; and distilled water, 113 parts.

Cotton and Coffee in New Zealand.—Attempts are now being made to introduce the cotton and coffee plants to New Zealand. Coffee-berries from Ceylon, and cotton-seed from China, have arrived at Auckland, and both are now deposited in the ground in the faith of yielding profitable results. Seeing that oranges, lemons, and other delicate fruits are already successfully cultivated in the northern portion of the colony, and that grapes of the very best quality are grown in the province of Auckland, there is no reason why the coffee and the cotton plants should not be also successfully cultivated in this land of promise.—*New Zealand London Examiner*, April 16.

SUICIDE BY NITRATE OF SILVER.

An inquest has been held by Mr. Wakley, at the Elephant and Castle, King's Road, St. Pancras, on the body of Morris Ascoli, aged 46, of 72a, Great College Street, Camden Town. It appeared that the deceased, who was an intelligent man, and master of several languages, had been in good circumstances, but had latterly been very much reduced; this preyed upon his mind, and, in a fit of despondency, he swallowed a large quantity of a concentrated solution of nitrate of silver, from the effects of which he expired ten minutes afterwards; leaving a widow with seven children. The jury returned a verdict to the effect, "That deceased died of poison administered by himself; but there was no evidence to show the state of his mind at the time."

ACCIDENTAL POISONING BY ARSENIC.

The life of the daughter of Mr. Ward, farmer of East Ville, has been sacrificed to the incautious depositing of arsenic in an improper place. The deceased, who was about 22 years of age, went to a cupboard for some sulphur for medicinal purposes, and took from the shelf what she conceived to be that drug in a powdered state, and swallowed it with some treacle. Shortly afterwards she was seized with violent vomiting, and on her mother inquiring the cause it was discovered that arsenic had been placed in the cupboard unknown to the sufferer, and she had taken it instead of sulphur. Medical assistance was promptly procured, but was unfortunately too late; she gradually sank and died. An inquest was held before Mr. J. C. Little, coroner, when a verdict of accidental death was returned.—*Stamford Mercury.*

SALE OF EXCISABLE ARTICLES.

Copy.] 1, *Trevor Terrace, Knightsbridge, February 27th*, 1860.

To the Honourable Commissioners of the Inland Revenue.

Gentlemen,—The *Pharmaceutical Journal* of this month contains a copy of a letter addressed to Professor Redwood, by Mr. Dobson, Assistant Secretary to

the Inland Revenue Department, in which he states that it is illegal to sell cocoa when mixed with dandelion, and, as I interpret it, any other substance whatever.

In ignorance of the law in that respect, I have for some time past prepared and sold a mixture of cocoa and Irish moss, and have expended a considerable amount of time and money in making it known. I presume that the prohibition of the sale of cocoa when mixed with any other substance, is intended to protect the public against the fraudulent adulteration of cocoa; but in my case, when Irish moss is mixed with cocoa, and it is distinctly stated on the label that it is a mixture of Irish moss and cocoa, it is obvious that it is not an adulteration.

I beg to remind the Board that coffee is permitted to be mixed with chicory, and the mixture sold as such; therefore, I pray that you will give this case your favourable consideration, especially as it is used medicinally, and permit the admixture of cocoa with other substances, under regulations which you may determine upon. In conclusion, I would direct your attention to the fact that there are several mixtures of cocoa and other substances sold—viz. homœopathic cocoa, lentilized cocoa, lichen cocoa, and an infinite variety of chocolates, and that to prohibit the sale of those compounds would entail great loss upon the manufacturers of them.

I have the honour, Gentlemen, to remain your most obedient servant,

J. B. Barnes.

Copy.]

Inland Revenue Office, Somerset House, London, March 31st, 1860.

Sir,—I am to acquaint you in reply to your inquiry of the 27th ultimo, that the Board will not interfere with the sale of your medicated cocoa, but a licence* must be held by any party disposing of it.

I am, Sir, your obedient servant,

Mr. J. B. Barnes. Wm. Corbett, *Assistant Secretary.*

The following communications have also been received by one of our Members:—

Copy.] *Inland Revenue Office, London, 18th April,* 1856.

Sir,—I am to acquaint you, in reply to your inquiry of the 17th instant, that parties selling the fluid extract of cocoa alone are not liable to any charge of licence duty by this department.

I am, Sir, your obedient servant,

C. F. Buckle, Esq. Wm. Corbett, *Assistant Under Secretary.*

Copy.] *Inland Revenue, Somerset House, London, 20th July,* 1855.

Sir,—I am to acquaint you, in reply to your letter of the 17th instant, that you are not required to take out a pepper licence, provided your sales are confined to Cayenne itself.

I am, Sir, your obedient servant,

Mr. C. F. Buckle. Wm. Corbett.

REGULATIONS OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND RELATING TO DENTAL SURGERY.

BYE-LAWS.

1. The board of examiners in dental surgery shall consist of three members of the court of examiners of this college, and of three other persons skilled in dental surgery.

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* Tea licence.

2. The members of the board shall be elected by the council of this college for the period of five years, but shall be eligible for re-election.

3. Should a vacancy occur in the board from the death or resignation of a member thereof, or from any other cause, such vacancy shall be declared at the next meeting of the council of this college, and filled up at the following meeting of the council, of which meeting seven days' notice shall be given by summons.

4. Should a member of the board be absent from more than three consecutive meetings, such absence shall be reported to the council holden next after the said three meetings; and the member so absenting himself, without assigning a reason satisfactory to the council, shall be liable to removal from the board by resolution of the council.

5. The board shall hold such meetings, and shall conduct its proceedings in such manner as the council of this college shall from time to time direct.

6. The senior member of the court of examiners of this college, on the board, shall act as chairman thereof, and in his absence the next senior member of the said court shall preside.

7. Candidates for the certificate of fitness to practise as a dentist shall comply with such regulations, respecting professional study and examination, as shall from time to time be required by the council of this college.

8. The fee for the certificate of fitness to practise as a dentist shall be ten guineas, over and above any stamp duty.

9. The certificate shall be in such form as the council of this college shall from time to time direct, and shall be signed by the several members of the board present at the examination of the candidate.

10. The chairman of the board may direct a special meeting of the board to be held on any emergency requiring, in his opinion, such meeting.

11. Every person on whose application and account such special meeting shall be held, and every other person examined at such meeting, shall severally pay five guineas; and shall also, on being approved, pay the same sum for the certificate as if he had been examined and approved at an ordinary meeting of the board.

12. No person shall be admitted to examination for the certificate of fitness to practise as a dentist until he shall have completed the twenty-first year of his age.

REGULATIONS RESPECTING THE PROFESSIONAL EDUCATION OF CANDIDATES FOR THE EXAMINATION IN DENTAL SURGERY.

Candidates will be required to produce the following certificates:—

1. Of being twenty-one years of age.

2. Of having been engaged during four years in the acquirement of professional knowledge.

3. Of having attended, at a school or schools recognized by this college, not less than one of each of the following courses of lectures, delivered by lecturers recognized by this college—namely, anatomy, physiology, surgery, medicine, chemistry, and materia medica.

4. Of having attended a second winter course of lectures on anatomy, or a course of not less than twenty lectures on the anatomy of the head and neck, delivered by lecturers recognized by this college.

5. Of having performed dissections at a recognized school during not less than nine months.

6. Of having completed a course of chemical manipulation, under the superintendence of a teacher or lecturer recognized by this college.

7. Of having attended at a recognized hospital or hospitals in the United Kingdom the practice of surgery and clinical lectures on surgery during two winter sessions.

8. Of having attended, at a recognized school, two courses of lectures upon each of the following subjects—viz. dental anatomy and physiology (human and comparative), dental surgery, dental mechanics, and one course of lectures on metallurgy, by lecturers recognized by this college.

9. Of having been engaged, during a period of not less than three years, in acquiring a practical familiarity with the details of mechanical dentistry, under the instruction of a competent practitioner.

10. Of having attended at a recognized dental hospital, or in the dental depart-

ment of a recognized general hospital, the practice of dental surgery during two winter and two summer sessions.

N.B. The students of the London schools are required to register the above certificates at this college; and special returns will be required from the provincial schools recognized by the council of this college.

Candidates who were in practice as dentists, or who had commenced their education as dentists prior to September, 1859—the date of the charter—and who are unable to produce the certificates required by the foregoing regulations, shall furnish the Board of Examiners with a certificate of moral and professional character, signed by two members of this college, together with answers to the following inquiries:—

Name. Age. Professional address. If in practice as a dentist, the date of the commencement thereof. Whether member or licentiate of any college of physicians or surgeons of the United Kingdom; and, if so, of what college. Whether graduate of any university in the United Kingdom; and, if so, of what university; and, whether graduate in arts or medicine. The date or dates of any such diploma, licence, or degree. Whether member of any learned or scientific society; and, if so, of what. Whether his practice as a dentist is carred on in connexion with any other business; and, if so, with what business. The particulars of professional education, medical or special. The Board of Examiners will determine whether the evidence of character and education produced by a candidate be such as to entitle him to examination.

February 9, 1860. EDMUND BELFOUR, *Secretary.*

N.B. Blank forms of the above inquiries may be obtained on application at the college.

AN ACT TO AMEND THE LAW RELATING TO THE UNLAWFUL ADMINISTERING OF POISON.

23rd March, 1860.

WHEREAS the present law has been found insufficient to protect persons from the unlawful administering of Poison, except in cases where the intent is to commit murder: Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

I. That whosoever shall unlawfully and maliciously administer to or cause to be administered to or taken by any other person any poison or other destructive or noxious thing so as thereby to endanger the life of such person, or so as thereby to inflict upon such person any grievous bodily harm, shall be guilty of felony, and being convicted thereof shall be liable to be sentenced to penal servitude for any period not exceeding ten years and not less than three years, or to imprisonment for any term not more than three years, with or without hard labour, at the discretion of the Court.

II. Whosoever shall unlawfully and maliciously administer to or cause to be administered to or taken by any other person any poison or other destructive or noxious thing with intent to injure, aggrieve, or annoy such person, shall be guilty of a misdemeanor, and being convicted thereof shall be liable to be sentenced to imprisonment for any period not exceeding three years, with or without hard labour, at the discretion of the Court, and the costs and expenses of the prosecution of any such misdemeanor may be allowed by the Court as in cases of felony.

III. If, upon the trial of any person charged with the felony above mentioned the Jury shall not be satisfied that such person is guilty thereof, but shall be, satisfied that he is guilty of the misdemeanor above mentioned, then and in every such case the Jury may acquit the accused of such felony, and find him guilty of such misdemeanor, and thereupon the delinquent shall be liable to be punished in the same manner as if convicted upon an indictment for the misdemeanor.

SELLING ADULTERATED PEPPER.

THREE informations were heard, April 17, 1860, against retail grocers in Prescot, for selling adulterated pepper. The defendants were Mr. William Quick, Mr. W. Hayes, and Mr. Proctor; and the information charged them with selling as pure pepper a mixture of pepper, mustard husks, and cereal starch.—Mr. Welsby, barrister, of London, instructed by Mr. Tyndal, of Liverpool, appeared for the Board of Inland Revenue; and Mr. Ward, of Prescot, for the defence.

Mr. Welsby, in opening the case, said the three informations would be dealt with simultaneously. The defendants were simply charged with selling the adulterated pepper; they were not charged with adulterating it, or with selling it with a guilty knowledge. The evidence was then proceeded with, and the local revenue officer stated that he purchased samples of the pepper at the shop of each defendant, who said they had purchased it from a Liverpool firm.—Mr. John Weir, chemical officer to the Board of Inland Revenue in Liverpool, detailed the results of a microscopical examination of the samples of pepper purchased from the defendants. The samples contained about five or seven per cent. of the husks of mustard-seeds, and a per-centage of cereal starch. He did not believe that the per centage of mustard husks could have been caused by the pepper being ground in a mill where mustard had previously been ground.—Mr. Williamson, assistant chemist to the London board, corroborated the above testimony. In the pepper sold by Quick he found a quantity of mustard husks, amounting to about eight per cent.; in that sold by Hayes five per cent. of husks and one per cent. of cereal starch; in that sold by Proctor the amount of adulteration was precisely similar. The amount of adulteration in each case was so similar that he could have no doubt the pepper had all been purchased from the same wholesale dealer. The per-centage of mustard husks was so large that it could not arise from the pepper being ground in a mustard mill.—By Mr. Ward: The adulteration would not be detected by a casual observer, and he had no doubt the mixture of the various substances was done in the mill.—Mr. George Phillips, analytical chemist, gave similar evidence; but he added, in reply to Mr. Ward, that the adulteration would not render the pepper noxious.—Sir Thos. Birch: Then, for all general purposes, this adulteration is immaterial?—Witness: It is so far material that you get eight per cent. less pepper. The adulteration is certainly not prejudicial to health.—Professor Archer detailed a minute microscopical and chemical examination which he had made of the samples of pepper, confirming in every respect the testimony of the previous witnesses as to the presence of mustard husks and cereal starch, and, in one instance, fragments of capsicum.—Dr. Edwards, of Liverpool, gave similar evidence, but he believed that the proportions of mustard husks in the pepper was at least ten per cent. The appearance of the pepper was rather improved by the adulteration.—The case for the Crown was brought to a close by the evidence of Mr. Dugald Campbell, physician to the Brompton Hospital.—Mr. Ward addressed the court on behalf of the defendants. His clients, he said, had purchased the pepper from a house which was represented to be one of the most respectable in the wholesale trade in Liverpool, the well known firm of Wright, Crossley, and Co. The defendants were perfectly ignorant that the pepper was adulterated, and he hoped the bench would inflict the lowest possible penalty, and they would then seek their remedy against the fraudulent tradesmen—if there was any fraud—who had placed them in this dilemma.

Mr. Welsby said this prosecution was only intended to give the Excise facilities for proceedings against the parties who had defrauded the revenue.

Sir Thomas Birch said he would willingly join in any recommendation to the London Board to remit the penalty, in order to prevent any hardship to the defendants, who were not the real delinquents.

Mr. Welsby said the penalty would not be exacted.

The defendants were then each fined in the mitigated penalty of £25,—one-fourth of the prescribed penalty,—and warrants were signed by the bench after considerable hesitation, Mr. Tyndal pledging himself that the warrants would not be executed.

Sir Thomas Birch.—I hope that further proceedings will be taken.

Mr. Welsby.—There is not the least doubt of that, and very speedily indeed.

Sir Thomas Birch.—Else there has been a goodly array of gentlemen here for nothing.

Mr. Welsby.—You are aware there have been difficulties in that respect.
Sir Thomas Birch.—How came you to fail so utterly in Liverpool?
Mr. Welsby.—Because we had not such a battalion, nor such a bench, I may add.
The proceedings then terminated.

OBITUARY.

We have just received the melancholy intelligence of the death of Mr. G. W. Smith, the late Secretary of the Pharmaceutical Society. Mr. Smith took an active part in the formation of our Society, and was elected to the office of Secretary at its establishment in 1841. He discharged his duties with untiring energy and great ability, until the end of the year 1856, when declining health obliged him to retire from all active pursuits. Since that time, he has resided at Brighton, at which place he died, after a short illness, on Monday night last.

REVIEWS.

The Micrographic Dictionary: *A Guide to the Examination and Investigation of the Structure and Nature of Microscopic Objects.* By J. W. Griffith, M.D., F.L.S., &c.; and Arthur Henfrey, F.R.S., F.L.S., &c., Professor of Botany in King's College, London. Second Edition. Illustrated by Forty-five Plates and Eight Hundred and Twelve Woodcuts. London: John Van Voorst, Paternoster Row. 1860.

The appearance of a second edition of the above valuable work in the short space of about four years is of itself strong evidence of the high estimation in which it is regarded. In its passage through the press the scientific world sustained a very severe loss in the death of one of the authors—Professor Henfrey—so that the task of writing the Preface to the present edition devolved upon Dr. Griffith. That gentleman states, however, that "it will be satisfactory to the reader to know that the whole had passed under the hands of the late lamented Professor Henfrey, and that he had taken his share in correcting for the press all but the last three sheets."

The *Micrographic Dictionary* is so arranged that, it not only forms a guide to the examination and investigation of the structure and nature of microscopic objects considered separately, but also enables the reader to acquire a general knowledge of particular departments of science.

An Introduction has been prefixed to the *Dictionary*, entitled, "On the Use of the Microscope and Examination of Microscopic Objects." The object of this Introduction has been to furnish instruction for the selection of a microscope and its accessory apparatus; to explain how to use them; the precautions necessary to be observed with foreign and cheaper instruments; and lastly, to enter fully into microscopical manipulation. This Introduction should be carefully studied by the young microscopist; and to those who have not been able to purchase our excellent but high priced object glasses, but have been obliged to content themselves with those of foreign manufacture, on account of their comparative cheapness, we direct especial attention to the precautions mentioned by the authors as important for them to follow in using such glasses, to prevent erroneous results being arrived at by them.

The authors in this edition have evidently devoted much care in bringing up the numerous subjects treated of by them to the present state of our knowledge, and the papers generally are remarkable, not only for their accuracy, but also for the able manner in which the subjects have been condensed. The portion of the work devoted to Microscopic Botany was the labour of Professor Henfrey; and it is that which comes more particularly within the province of the Pharmaceutical Chemist. Here he will find ample details upon the structure and functions of microscopic organisms, and the various economical products derived from plants. As a whole, we can scarcely speak too highly of the manner in which this portion of the work has been executed by the late lamented Professor Henfrey.

In a work embracing such a great range of subjects, it would be perhaps unfair to expect a complete knowledge of them all; and hence the critical observer may no doubt find some subjects at least to which he would consider that justice had not been fully done. Thus we, as Pharmaceutists, regard the information given by the author under the heads of arrowroot, sago, tapioca, cassava, &c., as far too meagre, incorrect, or indefinite. The incomplete nature of the information here given is especially to be regretted, as the microscopic appearances of the different commercial starches is one of much interest, not only to the pharmaceutical chemist, but to the public generally, affording as they do a ready means by which the experienced microscopist can distinguish one starch from another, and thus be enabled to detect the admixture of one starch with another, or the substitution of one for the other. We may quote one or two sentences out of several we have observed to illustrate our meaning. Thus, true West India arrowroot is stated to be derived from *Maranta arundinacea*, *M. Allonga*, and *M. nobilis*. Upon what authority, we ask, are the two latter plants alluded to as yielding a portion of our commercial West India arrowroot? The figures also, which are given of West India arrowroot most certainly do not represent commercial West India arrowroot. Again, East India arrowroot is said to be derived "from a species of *Curcuma*, and apparently also from a *Sagus*, if we may judge from a specimen from Singapore." The figures given of the latter evidently refer to a kind of sago. It should be remembered that we obtain our supplies of sago from Singapore, and the starch here described and supposed to form a portion of the East India arrowroot of commerce, has most probably been either erroneously forwarded to this country under that name, or some mistake has arisen here with regard to its origin. Again, cassava is described as "the coarser part of the starch (tapioca being the finer) derived from the fibrous roots of the *Jatropha Manihot*, L. (*Janipha Manihot*, Knth.; *Manihot utilissima*, Pohl.), a Brazilian plant of the family Euphorbiaceæ." This description of the different origins of cassava and tapioca is most indefinite, and, moreover, incorrect, as tapioca owes its peculiar structure and appearance to its peculiar mode of preparation.

The above are, however, but comparatively trifling blemishes in a work involving so much research as the present, and we have no desire to be too critical, for, as a whole, the present treatise is a most valuable contribution to science, and as such we strongly recommend it to our readers; indeed, the library of no medical practitioner or pharmaceutical chemist can be considered complete without it.

THERAPEUTICS AND MATERIA MEDICA: *A Systematic Treatise on the Action and Uses of Medicinal Agents, including their Description and History.* By ALFRED STILLÉ, M.D., late Professor of the Theory and Practice of Medicine in the Medical Department of Pennsylvania College, &c. &c. Two vols., royal 8vo, pp. 813 and 975. Philadelphia: Blanchard and Lee. 1860. Trübner and Co., Paternoster Row, London.

DR. STILLÉ has been engaged in the preparation of the above work for several years, but its completion has been delayed, chiefly in consequence of the onerous duties which devolved upon the author, as Professor of the Practice of Medicine in the Medical Department of Pennsylvania College. This delay has enabled Dr. Stillé to treat his subject in a more comprehensive manner than he originally intended, and in a way more worthy of his reputation. The work embraces the consideration of medicines in their physical, chemical, and physiological relations; the portion referring to the two former departments occupies, however, but a small part of the treatise; but the latter, embracing the consideration of the action of medicines upon man and the lower animals, is most fully and ably treated of in accordance with the design of the author, whose object has been to produce a treatise suited rather to the bedside of the sick than in the laboratory or the lecture-room. The work is therefore especially designed for medical practitioners; these will find in it much matter that is new and valuable, and which proves that the author is not only an accomplished scholar, but also a careful observer and sound practical physician. We cordially recommend the work, therefore, to the medical practitioners of this country.

BOOKS RECEIVED.

ADJUMENTA VARIA CHEMICA ET PHARMACEUTICA ATQUE SUBSIDIA AD PARANDAS AQUAS MINERALES. Auctore, Dr. H. HAGERO, Lesnae.

THE COMPARATIVE PROPERTIES OF HUMAN AND ANIMAL MILKS; *a New Theory as to "Essences," and a New Interpretation of some Physiological Facts.* By M. A. BAINES. London: John Churchill, New Burlington Street. Sold also by L. Booth, Regent Street; and W. Tweedie, Strand.

TO CORRESPONDENTS.

J. T. H. (*R. A. P. S.*)—Botanical specimens may be labelled as follows:—

Chenopodiaceæ,
Atriplex littoralis,
Grass-leaved Sea Orache.
Loc.—Near Rye, Sussex.
Tem.—July 4, 1859.
Col.—J. T. H.

This label should be placed at the right-hand corner at the bottom of the paper upon which the specimen is preserved. The species of each genus should be put into separate covers, and the generic names written on the left-hand side at the bottom of the respective covers. The genera ought to be afterwards collected and arranged in their respective Natural Orders, and the latter then grouped together into Sub-Classes, and Classes, &c.

"546" (Maldon) is thanked for his communication.

Lector.—(1.) See any elementary work on Chemistry. (2.) The contamination alluded to might possibly occur. (3.) "Oil of Grapeseed" is evidently a misprint for Oil of Rapeseed, which may be obtained of any oilman.

A Beginner.—(1.) An ivory turner would supply the information required. (2.) Of all the labels alluded to, one only (No. 1) is liable to the Medicine Stamp Duty.

Omega.—(1.) A list of the names of subscribers to the Benevolent Fund will be found in our last number. (2.) Liquor Quinæ Ammoniatæ, vol. xiii., p. 344. (3.) The expressed oil.

An Assistant.—A weak solution of ammonia.

An Apprentice.—By means of a little mucilage; adding the Liquor Potassæ last.

W. H. (Altrincham).—*Photographic Collodion*, vol. xviii., pages 200 and 334.

A Correspondent (Watford) wishes to know where a preparation called "Wetherel's Brown Salve" can be obtained.

A. P. S. (Liverpool.)—As there is a recognized formula for the simple tincture, the compound should not be substituted for it, without good reason for supposing that such was the intention of the prescriber.

M. P. S. (Bath.)—See page 497 of our last number.

T. S. (Exeter.)—It will be seen on again referring to the Pharmacopœia, that there is no error in the proportions alluded to.

M. P. S. (London.)—See vol. iii., pages 94, 143, 192, and 341.

X. Y. Z.—Vol. xii., page 359.

Discipulus.—(1.) Gingerine may be prepared by evaporating an alcoholic tincture of Ginger. (2.) Vol. xvi., page 472; vol. xvii., page 168. (3.) The bubbles are due to the presence of a little water, which may be driven off by the application of more heat.

Vigilate (Southampton.)—Tobacco is sometimes found to be contaminated with lead, derived from the packages in which it is enclosed; this might possibly, although not very probably, account for the symptoms described.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, ELIAS BREMRIDGE, 17, Bloomsbury Square, W.C.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington St. Other communications to the Editors, 17, Bloomsbury Sq.

THE PHARMACEUTICAL JOURNAL.

SECOND SERIES.

VOL. I.—No. XII.—JUNE 1st, 1860.

ADULTERATION OF FOOD AND DRINK BILL.

The Bill now before Parliament for preventing the adulteration of articles of food or drink, having passed the second reading in the House of Lords, and opposition and further alteration being now very improbable, some of our readers may desire to know what its provisions are, and what will be the probable effect of it when it has become law.

The preamble states that "The practice of adulterating articles of food and drink for sale, in fraud of her Majesty's subjects, and to the great hurt of their health, requires to be repressed by more effectual laws than those which are now in force for that purpose."

It enacts that "every person who shall sell any article of food or drink with which, *to the knowledge of such person*, any ingredient or material *injurious to the health* of persons eating or drinking such article as has been mixed, and every person who shall sell *expressly warranted as pure or unadulterated* any article of food or drink which is adulterated or not pure," shall, for every such offence, forfeit and pay a penalty not exceeding five pounds, nor less than five shillings, together with the costs of conviction.

And if any person so convicted shall afterwards commit the like offence, the justices before whom the case has been proved, may cause the offender's name, place of abode, and offence, to be published in such newspaper, or in such other manner as the Justices may think desirable.

For the putting of the proposed law into effect it is specified that in England, the Vestries, District Boards of Local Management, Courts of Quarter Sessions, or Town Councils, and in Scotland, the Commissioners of Supply, and Town Councils, *may*, for their respective districts, &c., appoint or remove one or more persons possessing competent *medical*, *chemical*, and *microscopical knowledge*, as analysts of all articles of food and drink purchased within such districts, and *may* also provide a convenient office, &c., for such analysts, and *may* pay to such analysts such *salary* or *allowances* as they may think fit.

The appointment of analysts is, therefore, to be left optional with the Vestries, Town Councils, &c., and it is further to be left to the discretion of those bodies whether the analysts are to receive salaries in addition to the fees specified in the Bill. The following is the mode of remuneration specified:—

"Any purchaser of any article of food or drink in any district, county, or borough in England where there is any analyst appointed under this Act shall be entitled, on payment of a sum not less than two shillings and sixpence, nor more than ten shillings and sixpence, to have any such article analyzed by any analyst who may be appointed for such district, county, or borough, and to receive from such analyst a certificate of the result of his analysis, specifying whether in his opinion such article is adulterated, and also whether it is so adulterated as to be injurious to the health of persons eating or drinking the same; and such certificate duly signed by such analyst shall, in the absence of any evidence to the contrary, be sufficient evidence before the Justices, or in any Court of Justice, of the matters therein certified, and the sum so directed to be paid for such certificate shall be deemed part of the costs."

Any two Justices of the Peace in England and Scotland, or the Justices at Petty Sessions, or a Divisional Justice in Ireland, may hear complaints and summarily convict offenders, under this law.

On the hearing of such complaint "in any district, county, or borough, wherein any analyst shall have been appointed, the *purchaser* shall prove to the satisfaction of such Justices that the *seller* of the article of food or drink alleged to be adulterated, *or his servants*, had such notice of the intention of the purchaser to have such article analyzed, and also such opportunity of accompanying the purchaser to an analyst appointed by this Act, as the Justices shall think reasonable, in order to secure such article from being tampered with by the purchaser."

The Justices before whom any complaint may be made under this Act *may, in their discretion*, cause any article of food or drink to be examined and analyzed by such *skilled person* as they may appoint for that purpose, who may be required to give evidence of the same at the hearing of the case; and the expense thereof, and of such examination and analysis, if not paid by the complainant or party complained against, shall be deemed part of the expenses of executing this Act, which are to be paid out of the rates or funds raised for local management, or out of the county rate, or borough fund.

Persons convicted of any offence punishable by this Act will have the power of appealing to the General or Quarter Sessions, provided notice be given within two days after the conviction.

Lastly, "in the construction of this Act the words 'articles of food or drink' shall (if not inconsistent with the context or subject matter) include not only all alimentary substances, whether solids or liquids, but also all eatables or drinkables whatsoever, not being medical drugs or articles usually taken or sold as medicines, but this Act shall not be construed so as to affect the ordinary reduction of the strength of Foreign, British, or Colonial spirits by persons licensed and paying duties under the Excise."

It will be seen that there are only two classes of offence to which this Act will apply, namely—1st. The sale of any article of food or drink which is known by the person selling it to contain something injurious to health; and 2nd. The sale of any article of food or drink expressly warranted as pure or unadulterated, which is adulterated or impure.

Dealers cannot complain of any oppressive tendency in this measure, as their interests appear to have been well considered; hence there has been little or no opposition offered to the Bill, and as it has now been read a second time in the House of Lords, it will, no doubt, shortly be passed. How far it will accomplish what its originators expect, remains to be seen. Probably it will do all that is required, or rather all that can be safely effected, without entailing the necessity for an expensive analytical establishment, with a central board, such as was originally contemplated.

Some remarks on this subject will be found in the report of a meeting of the Liverpool Chemists' Association, at page 554.

The appointment of "Analysts" will, no doubt, attract the attention of many of our Members, as well qualified Pharmaceutical Chemists would generally possess the requisite knowledge to fit them for such appointments, although certainly the fees are not sufficient to afford adequate remuneration for the troublesome and responsible work which will often be imposed on these officers. In localities where officers of health are appointed, the gentlemen holding that office will probably be also made analysts, as the two appointments would very well accord.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, 2*nd May*, 1860,

Present—Messrs. Bird, Bottle, Bucklee, Davenport, Deane, George Edwards, Hanbury, Haselden, Herring, Lescher, Meggeson, Morson, Sandford, Squire, and Waugh, the following were elected

MEMBERS.

JERSEY .....Ereaut, John
KINGSTON-ON-THAMES .....Walmsley, Samuel
LONDON .....Davies, William G.
MANCHESTER .....Halliday, William Jabez
NEWPORT .....Tucker, Henry

MEETING OF THE COUNCIL, 16*th May*, 1860,

Present—Messrs. Bird, Bottle, Bucklee, Davenport, Deane, George Edwards, J. B. Edwards, Hanbury, Haselden, Herring, Lescher, Macfarlan, Meggeson, Morson, Sandford, Squire, and Waugh.

SUBSCRIPTIONS TO THE JACOB BELL MEMORIAL—(*Continued.*)

Amount previously advertised, £1769 5*s.* 0*d.*

	£	s.	d.
Althorp, James, Stamford	1	1	0
Anderson and Co., Worcester	1	1	0
Bacon, John Turner, 9, River Terrace, North	2	2	0
Beaton, John, 174, Shoreditch	1	1	0
Bell, Francis, Bradford	1	1	0
Berrell, Charles, London	0	10	6
Botwright and Kemp, Messrs., Islington	2	2	0
Corfield, Daniel, 22, Thrawl Street	2	2	0
Cox, Henry, Westminster	0	5	0
Cross, William G., Shrewsbury	1	1	0
Davis, Richard H., Harrogate	0	10	6
Dickens, Charles, Tavistock House, Tavistock Square	5	0	0
Doughty, Richard, Bushey	1	1	0
Eastlake, Sir Charles, President R.A., 7, Fitzroy Square	2	2	0
Edwards, William, Denbigh	0	5	0
Fenn, John T., 83, Regent Street, Westminster	1	1	0
Flux and Argles, Messrs., 68, Cheapside	5	5	0
Gardener, Charles, Tunbridge Wells	1	1	0
Greaves, Abraham, Ironville	1	1	0
Henson, Matthew, Dunstable	0	10	6
Hewlins, Edward, Leatherhead	0	10	6
Hill, Thomas, South Norwood	0	10	6
Hofmann, A. W., Ph.D., F.R.S., 9, Fitzroy Square	1	1	0
Hunt, Richard, Andover	1	1	0
Huskisson, John, 12, Swinton Street	5	5	0
Jones, Ellis P., Rhyl	1	1	0
Kemp, Robert, Holloway	1	1	0
Kendall, Frederick, Stratford-on-Avon	1	1	0

	£	s.	d.
Landseer, Sir E., R.A., 1, St. John's Wood Road	5	0	0
Lee, Frederick R., R.A., Broadgate House, Barnstaple	1	1	0
Miller, Thomas L., Blandford	0	10	6
Muriel, Harry B., Brighton	1	1	0
Otter, William, Bloxham	0	5	0
Phillips, William T., Carmarthen	0	10	6
Reynolds, William, Halesworth	1	1	0
Shillcock, Joseph, Bromley	0	5	0
Thackeray, William Makepeace, 36, Onslow Square	5	0	0
Tippett, Benjamin M., 3, Sloane St. (second subscription)	1	1	0
Towerzey, Alfred, 20, Marylebone Street	1	1	0
Twinberrow, John, Worcester	0	10	6
Tyler, Henry W., Worcester	0	10	6
Woodcock, Joseph, Leicester	1	1	0

CONVERSAZIONE.

The annual Conversazione of the Pharmaceutical Society was held on Tuesday evening, the 15th of May. A considerable addition having been recently made to the premises occupied by the Society, the Council had caused a new suite of rooms to be thrown open on this occasion for the reception of the invited guests, who were more numerous than usual, and comprised many distinguished members of the medical profession and other scientific men. One of the objects which attracted much attention was a portrait of the late President of the Society, Mr. Jacob Bell, by Sir Edwin Landseer. This was an unfinished but but very remarkable work of art. It was produced at a sitting of only one hour, taken three days before Mr. Bell's death. The likeness is striking, and, when finished, will, no doubt, be fully worthy of the great reputation of the artist. There were some other pictures with which the walls were decorated, including the portrait of William Allen, the first President of the Pharmaceutical Society, and some paintings for which the Council were indebted to Mr. Vokins. Among these were also exhibited the plans of the extensive new laboratories about to be erected on the top of the premises occupied by the Society, and a perspective view of the building as it will appear after the alterations now in progress have been made. There was also a beautiful set of zoological prints, which had been kindly supplied by Professor Bell, the President of the Linnean Society. Some new and interesting productions and applications of the photographic art were exhibited by Mr. Joubert, Dr. Gladstone, and Messrs. Powell and Sons. Mr. Joubert has succeeded in fixing photographic pictures on glass and porcelain, and some very beautiful specimens of this art were exhibited. The photographs exhibited by Dr. Gladstone served to illustrate a very remarkable property possessed by fluorescent substances. Thus it is found that if a figure be traced on paper with solution of sulphate of quinine, or other fluorescent substance, the tracing, when dry, although invisible to the eye, will produce a marked image on a sensitive photographic plate, so that a photograph may thus be taken of an invisible object. The specimens exhibited by Messrs. Powell and Sons consisted of photographs applied to glass, and used for ornamenting glass vases, &c.

The Council were also indebted to Mr. Joubert for some illustrations of his process of acirage, which consists in depositing a hard coating of iron or nickel over the surface of an engraved copper plate, by which the plate is rendered capable of yielding a greatly increased number of impressions before the engraving becomes effaced. This process has been found to be of considerable value.

A tea service in jewelled Sèvres china, exhibiting beautifully executed portraits of Louis XVI. and his family, was contributed by Mr. George Roots; also some interesting specimens of pottery taken from the lost cities of Peru, an egg of the Emu, and two Chinese sceptres, by the President. An air pump of a new construction, and very fine workmanship, recently presented to Dr. Hofmann by the Comte de Paris, was kindly lent to the Council for exhibition by Dr. Hofmann, and was shown in action during the evening.

Mr. Appold showed some interesting experiments on the freezing of water, and also on the elasticity of iron. In the latter experiment a stout iron ring was provided, several inches in diameter, and of such a substance as to apparently prevent the possibility of its form being in the slightest degree affected by the mere muscular force of one man; an iron rod was placed across the interior of the ring, and fitted in with sufficient tightness to retain its position without other support. Then, placing the apparatus horizontally on a table, by merely pressing with the fingers upon the outside of the ring in a direction transverse to that occupied by the rod, the latter dropped through, proving that a certain amount of alteration had really been effected in the form of the ring by the slight pressure applied.

Mr. Griffin exhibited his new gas furnace, of which a full description has been given in a recent number of this Journal. The apparatus was put into operation during the latter part of the evening, and about a pound of cast iron was readily and completely fused.

There was a large number of medical, economical, and other plants, in the living state, distributed through the rooms, including the Castor Oil plant in fruit, the Tea plant, the Olive-tree, Guaiacum, Japan Wax-tree, Croton Oil, Date Palm, Surinam Quassia, Pimento, Sugar Cane, Cinnamon, &c. &c. These were kindly contributed by the Royal Botanic Society.

There were also some interesting botanical specimens supplied by Mr. N. B. Ward, of Clapham Rise.

Among other objects of interest, the Council were indebted to Mr. Hadow, who contributed some specimens of the platino-cyanides. These salts have been recently investigated by Mr. Hadow, and many of them possess singular beauty.

To Mr. Long, for specimens of crystallized potassium and sodium.

To Mr. T. B. Groves, of Weymouth, for a collection of sea-weeds, collected and carefully mounted and named by Miss Annie Pidgeon, of Weymouth.

To Dr. W. S. Squire, for some mirrors coated with silver by Baron Liebig's process, and protected by a deposit of copper. Also specimens of chloride of lithium and of parasorbic acid, a new acid obtained from the berries of the mountain ash, and recently investigated by Dr. Hofmann.

To Dr. Letheby, for some specimens of butyric acid and its compounds which had been extracted from sewage.

To Mr. Warington, for a specimen of an efflorescence of chloride of potassium, noticed by him some years back, and described in the Journal of the Chemical Society.

To Mr. Perkin, for specimens of fabrics dyed by means of colours produced from coal tar.

Messrs. Simpson and Maule also supplied samples illustrative of the same subject.

To Mr. Tennant, for models of the large gold nuggets, one from the Kingowen diggings, and the other from Bakery Hill, Ballarat; also an ancient Greek amphora.

To Mr. T. H. Hills, for a fine specimen of crystallized bismuth, and a Chinese carving in realgar.

To Messrs. Johnson and Matthey, for some specimens of platinum obtained by the new processes of fusion devised and patented by M. Deville, and also some specimens of aluminium.

To Mr. William Hooper, for some specimens illustrating the application of India-rubber for the construction of sub-marine telegraph cables; and an apparatus for testing the insulation of wires used in sub-marine telegraphy. The apparatus consisted of two electrometers of delicate construction; by attaching one of them to a Leyden jar, the pith balls on a suspended needle indicate the amount of electricity received, the needle remaining stationary providing the insulation is perfect; but if any loss takes place, the precise amount is shown by the pith balls in the second instrument, which is attached to the specimen tested.

To Mr. Haselden, for a chlorine inhaler and fumigator.

To Mr. Palmer, for specimens of olive branches from Bethlehem and the Mount of Olives.

To Mr. Frederick Ransome, for specimens illustrating his patented process for preserving stone. By this process, the material operated upon is impregnated with a solution of silicate of soda to such a depth as its absorbent character may determine. A solution of chloride of calcium is subsequently applied, when double decomposition takes place, and common salt and silicate of lime result, the latter forming a solid and indestructible mineral in the texture of the stone. A new water filter by Mr. Ransome was also exhibited.

To Messrs. Powell, for specimens illustrating the manufacture of glass and some of its applications.

To Dr. Müller, for some specimens of paper parchment and its different applications.

To Mr. Brewer, for a case of minerals and a collection of New Zealand ferns.

To Mr. Whipple, for a specimen of soap made from the offal of slaughtered animals.

To Mr. M. C. Cooke, for a collection illustrating the manufacture of paper from woody fibres, straw, &c.

To Dr. Normandy, for a drawing of his apparatus for the distillation of sea-water, by which a constant supply of fresh water is obtained.

To Captain Chiosso, for his polymachinon.

To the Gutta Percha Company, for a number of specimens illustrating their manufactures.

To Messrs. Joske and Young, for their patent bitumenized pipes.

To Mr. Norton, for Hawkesley's patent pump.

To Mr. Thompson, for his hydro-pneumatic inhaler.

To Mr. George Knight, for a medical magnet machine, and also an electro-magnetic chromatrope, by which some beautiful effects were produced.

To Messrs. Horne and Thornwaite, for a trocheidoscope, an optical instrument introduced by Mr. Goodchild for the production of coloured patterns, &c.; for a lamp shade containing several beautiful photographic transparencies, taken by Mr. J. Martin; some copying cameras and other photographic instruments; and for some apparatus giving kaleidoscopic effects with polarized light.

To Mr. Bestall, for some simple apparatus illustrating the polarization of light.

To Mr. Pedley, for a hand lathe for dentists.

To Messrs. Elliot Brothers, for a working model of a turbine or horizontal water-wheel, an Appold's pump, and other apparatus.

To Mr. Davis, for a patent railway metallic grooved lath.

To Messrs. Gilbertson, for some vases illustrating the means adopted in the coloration of glass.

To Messrs. Savory and Moore, for their new eye douche.

Messrs. Maw and Sons exhibited various mechanical arrangements in the shape and construction of bottles, for the prevention of accidental poisoning, a new collodion tissue, and Daulke's patent water purifier.

Mr. Pillischer contributed some microscopes, in addition to those belonging to the Society, the Professors, and the Members of Council; and Mr. Collis furnished some table ornaments in silver, including a handsome statuette of the Queen in oxidized silver.

NINETEENTH ANNIVERSARY
OF THE PHARMACEUTICAL SOCIETY,

May 16th, 1860.

MR. T. N. R. MORSON, PRESIDENT, IN THE CHAIR.

The President opened the meeting with the following Address :—

Gentlemen,—When I last year read to you from this place the Address of our late lamented President, in which he placed before you almost a history of his Pharmaceutical life, or rather of the means he had adopted to bring together and unite the various, and, in many instances, unkindred spirits of our trade, I had hoped that he might have been spared to us for some time longer, and enabled, with assistance, to carry out the extended educational plans he had so much at heart; and when he was present and re-elected President on the 1st of June, I, at his request, consented to act as deputy, and again took the Vice-Presidential chair.

Although it was painfully evident to all present at our first Council that his ultimate recovery was impossible, yet his mental powers having lost nothing of their activity, it was thought he might still have aided us with his ever active pen. I need not tell you that these hopes were not realized, for in eleven days he was summoned to his Maker's presence, after great suffering borne with Christian resignation, but prepared for the great change he was about to undergo. I was with him on the day, and quitted him only an hour before his death, his mental powers and zeal remaining with him to the last.

The energy of the late Mr. Bell in all matters he undertook, his liberality both as regarded time and money, will make his loss severely felt by this Society, and it will be difficult to find any single individual in a condition to take his place and perform his work. Elected as his successor by your Council, I again, gentlemen, appear as your President, a position I never expected to occupy again; and my year of office having ended, it is my duty to call your attention to the Report and other matters relating to this Institution.

I may safely congratulate you on the present state of the Society, which, with unity and the exercise of judgment in your future councils, cannot fail not only to maintain its position, but to advance to a far higher one in public estimation. This, however, like all matters in life, must be the result of exertion, and well directed exertion, and the first point to which your attention must be given is that of education. So strongly was this felt by your late President, that one of the last acts of his life was to leave you by his will the liberal sum of £2000 for this express purpose, and also the copyright of the Journal he had

established, with very many anxious suggestions for its future guidance. This liberality has not been lost upon your Council, and I trust the result will justify the most sanguine expectations and hopes of the donor, and prove a lasting benefit to our successors.

It has been for some time in contemplation to provide a practical laboratory of the first class, such a one as may serve for a model, and enable our students, now greatly increasing in numbers, to perfect themselves in their art, our present arrangements having been found insufficient for that purpose. This work has been now commenced after due consideration, and will, I trust, be ready by the next session for the reception of pupils.

The arrangements for lectures, and for that most important branch of our system, the examinations, will also be greatly improved, and rendered in all respects efficient for the object in view, and we trust all these matters will meet with your approval and support.

I will now call your attention, gentlemen, to another subject connected with education, the founding of the Bell scholarships, the arrangement of which will form an important duty for your new Council to perform. The sum already subscribed amounts to £1809 13*s*. 6*d*., but we trust yet to receive a considerable augmentation of the amount. The names of very many of our Members still remain to be added to the list, and we hope you will individually aid us in this matter. This testimony to the memory of Mr. Bell has not only received the sanction of our own immediate body, but of the most distinguished professors of the healing art, and many friends of educational progress.

The establishment of these scholarships will, in fact, not only do honour to the memory of the gentleman whose name they bear, but prove our desire as a body to offer every possible encouragement to the industrious inquirer after knowledge.

I am glad to have no Poison Bill or legislative movements injurious to us as a body to bring before you; it is quite a relief to have a year of repose from such useless agitation.

The editors of your Journal have used their best endeavours to bring before you as early as possible all matters bearing on our trade and profession, and I can assure you that editorial duties are not light, and require no small amount of caution and judgment. The unlimited demand for trade secrets, and the receipt of contributions whose covert object is advertisement, have constantly to be dealt with. Every useful improvement should receive full publicity, but, as a body, we ought never to make ourselves responsible by furthering private ends, or advancing what may justly be called quackery.

The past year has produced few important additions to our list of remedial agents; modifications of old remedies, in which iron and phosphoric acid figure largely, are the most numerous; but there is one subject, lithia and its salts, which will merit attention, as these remedies appear likely to be usefully employed. Mr. Ure some time since proposed their use, but Dr. Garrod has more recently called attention to their employment in gout and calculus deposits.

I will not further occupy your time, but direct your attention to the Report, which your Secretary will read.

The Secretary read the following

REPORT OF THE COUNCIL.

FINANCIAL STATEMENT—*From 1st January, to 31st December*, 1859.

RECEIPTS.	£	s.	d.
Balance in Treasurer's Hands	275	9	6
Life Members' Fund:			
29 Life Members' Fees 210 0 0			
Interest 38 19 0			
	248	19	0
Benevolent Fund:			
Subscriptions 54 7 0			
Interest 150 16 4			
Return Income Tax on Interest 39 4 7			
	244	7	11
Government Securities, Interest	162	18	9
Rent	233	10	0
Fees:			
20 Pharmaceutical Chemists 105 0 0			
48 Assistants 199 10 0			
72 Apprentices 151 4 0			
	455	14	0
Subscriptions:			
381 London Members 400 1 0			
1632 Country Members 1713 12 0			
172 Associates 90 6 0			
90 Apprentices 47 5 0			
	2251	4	0
Arrears of Subscriptions	78	15	0
Lecture Fees	49	7	0
Sale of Journals	6	18	0
Balance of Petty Cash due to Secretary	2	6	11
	£4009	10	1

EXPENDITURE.	£	s.	d.
Life Members' Fund:—			
Investment	281	8	0
Benevolent Fund:			
Gratuities	35	5	0
Conversazione 35 10 6			
Pharmaceutical Meetings 13 8 5½			
Repayments 11 0 6			
	59	19	5½
House Expenses	29	4	5
Rent, Rates, Taxes and Insurance (including £50 to Secretary for Rent)	513	6	11
Alterations and Repairs	41	13	8
Fixtures and Fittings	35	14	3
Museum	207	8	2
Laboratory	10	0	0
Library	39	8	6
Furniture	1	7	0
Stationery	10	8	4½
Printing and Engraving	65	6	2
Advertisements	8	14	2
Journals	862	7	5
Journals, Delivery of	171	19	0
Postage	65	0	1
Carriage	1	6	10
Collector's Commission	31	0	3
Travelling Expenses, Country Members	136	7	0
Salary, Secretary	225	0	0
Wages	142	0	0
Gratuity to Mrs. Morris	75	0	0
Pension to late Secretary	150	0	0
Expenses of Society in Scotland	66	16	0
Board of Examiners	73	10	0
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	300	0	0
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	250	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prize Medals, &c.	3	18	0
Repayment to Secretary, Petty Cash	5	15	10
Balance in Treasurer's hands	89	5	7
	£4009	10	1

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct agreeably with the foregoing statement, and that, as shown by the Books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st day of December, 1859:

	£	s.	d.
On Account of the General Fund, New 3 per Cents.	5643	0	2
Benevolent Fund, 3 per Cent. Consols	5134	9	3
Life Members' Fund, 3 per Cent Consols	1620	4	0

At that date there was due from the General Fund
to the Life Members' Fund ...£210 0 0

Do. from the General Fund
to the Benevolent Fund 210 3 11

WILLIAM BOWER,
STEPHEN DARBY,
ARTHUR BOWDLER HILL,
HAMERTON RICHARD PEACOCK,
JAMES B. BARNES,
} Auditors.

February 10, 1860.

Within the short space of a month from the day on which the last annual Report was presented, the Council had to perform the painful duty of following to the grave the remains of their lamented President, who had been one of the most active originators of the Society, and who was at all times the able, zealous, and disinterested advocate of the best interests of the Pharmaceutical body which the Society represents. To the last hour of his life, Mr. Jacob Bell continued to exercise his anxious solicitude for the welfare of this Institution. One of his latest acts consisted in the assignment of the copyright of the PHARMACEUTICAL JOURNAL to the Society, and by his will he bequeathed the liberal sum of £2000, free of legacy duty, "to be expended in establishing or otherwise increasing the efficiency of the School of Pharmacy, or in promoting Pharmaceutical education in such manner as the Council of the said Society shall deem expedient."

The Council have not been unmindful of the responsibility which was thus thrown upon them, and much attention has been devoted to the consideration of the most suitable means of applying the bequest, and also of raising a lasting memorial of the valuable services which had been rendered by Mr. Bell in elevating the position and advancing the interests of the members of the Pharmaceutical profession. Some memoranda in the handwriting of the deceased, relating to the management of the Journal, having been laid before the Council, together with the document assigning the copyright of the Journal to the Society, and a statement of the sum left for the School of Pharmacy, a resolution was passed in which the Council pledged themselves faithfully to carry out the expressed wishes of the donor.

It was thought that the most appropriate mode of raising a memorial of Mr. Bell would consist in establishing Pharmaceutical Scholarships bearing his name, to be founded by public subscription, and applied for the encouragement and assistance of successful and deserving students in the school which he had himself so liberally endowed. His name would thus be permanently associated with one of the objects of the Society in which he had always manifested a deep interest, while an opportunity would be afforded to all parties of testifying their appreciation of Mr. Bell's services, and at the same time of furthering the cause in the interests of which he had devoted the best energies of his life. The Council have much satisfaction in referring to the result of the appeal which has been made on behalf of this memorial. Not only is there a large sum already subscribed, but the proposition has received the support and approbation of many distinguished members of the medical profession, and of men eminent in their several positions, whose co-operation will give increased effect to the undertaking.

The conditions on which the sum of £2000 was bequeathed having limited and defined its application, the Council, in strict accordance with the terms of the bequest, have determined to expend the amount in the erection of a new Laboratory for the instruction of Pharmaceutical Students. For some time past the accommodation afforded in the existing laboratories of the Society has been found unequal to the requirements of the school, and this has especially been the case during the present session. Prior to the period now referred to, a Committee had been appointed to consider the practicability of providing increased and improved laboratory accommodation, and they had recommended the Council to undertake the construction of a new laboratory. The Council having reason to believe that Mr. Bell had contemplated such an application of his bequest, and considering, moreover, that the efficient maintenance of a School of Pharmacy is essential for supplying a class of educated men capable of passing the examinations required for admission into the Society, directed their attention to the means by which the desired object could be most beneficially accomplished. After a lengthened inquiry, in the course of which

several plans were suggested, which were found to be impracticable or undesirable, the Committee, to whom the subject had been again referred, came to the unanimous conclusion that the most feasible plan was that of constructing a laboratory on the top of the premises occupied by the Society, including the houses in Great Russell Street, of which, as well as of the house in Bloomsbury Square, the Society has a long lease. It was found that a very spacious suite of lofty and well-ventilated laboratories could thus be provided, capable of accommodating from sixty to a hundred pupils. The Council have adopted this plan, and arrangements have been made for carrying it into immediate effect, at a cost, for the building, independent of the necessary fittings, of £1719. It is hoped that these new laboratories will be completed by the commencement of the next session.

With the greatly increased and improved means which will be thus provided for laboratory instruction, there is reason to anticipate a continued augmentation in the number of pupils attending the school. The desire evinced for acquiring scientific instruction appears to be steadily growing, and the attendance at the Lectures has been unusually large during the present session. The effect of this increase in the number of students will, no doubt, be manifested, before the end of the year, in the number presenting themselves for examination. During the year 1859, the numbers who passed the examinations were as follows:—

Classical ... 72 —— Minor ... 55 —— Major ... 27.

The great importance of maintaining and augmenting the infusion of new blood into the body, by the introduction of Members through examination, is rendered more evident every year, as the number of those who have been the supporters of the Society from the commencement is becoming diminished by death and other causes. Many of those who took part in forming the Society, or who, by their services, have contributed to advance its interests, have already passed from amongst us; and the Council regret to have now to add to the number of these the name of Mr. George Walter Smith, who was one of the earliest promoters of the Association which resulted in the establishment of the Pharmaceutical Society, and who laboured for many years as its zealous and faithful Secretary. Mr. Smith, who, from ill health, was obliged to resign the office of Secretary in 1856, died at Brighton on the 23rd of last month.

The evening meetings have been well attended, and several subjects of interest have been discussed at them. There has been no evidence of any falling off in the interest taken in the proceedings at these meetings, but the Council would be glad to see a larger attendance of those Members whose practical experience would enable them to assist by communicating valuable information. There can be no doubt that much benefit accrues from the social intercourse and interchange of opinions, as well as from the communication of facts, for which the evening meetings afford suitable opportunities.

The Pharmacopœia Committee are still engaged in the revision of the processes contained in the three British Pharmacopœias, and in considering what alterations it is desirable to recommend to the Committee of the Medical Council. In addition to these duties, which are performed by the Committee of this Society, in compliance with a request to that effect from the Committee of the Medical Council, the delegate who was appointed to confer and co-operate with the Pharmacopœia Committee of the Medical Council, representing the Pharmaceutical Society at their meetings, continues to exercise those duties.

In reviewing the proceedings of the Society for the past year, the Council have been impressed with the feeling that, while one event has tended to cast a gloom over the general aspect of affairs, there is, nevertheless, much cause for encouragement and satisfaction, in observing the progress which has been made in carrying out the important objects for which the Society was established, and

the extent to which the value of these objects has been recognized by the medical profession and the public.

Mr. Savage (Brighton) said, as a country Member, he considered the greatest thanks were due to those gentlemen who took an active part in the affairs of the Society, which he now looked upon as one of the established institutions of the country, and likely to effect a larger amount of good than could have been calculated upon when its formation was first suggested. Every year produced evidence of its utility, and the advantages resulting from professional combination were strikingly illustrated in the agitation that had taken place, especially under the late Mr. Bell's directions, relative to legislation regulating the sale of poisons—when an amount of facts and details was brought to the notice of the profession and the public scarcely known or recognized before. The report contained so much detail, that it required little from him to recommend its adoption by the meeting. There was, however, one item to which he would call attention—viz. the excess on the amount charged for the Journal this year, but he had been informed by the Secretary that an extra quarter was included in that charge ; and, in passing, he could not refrain from expressing his opinion of the efficiency of that gentleman, and the readiness with which he at all times gave the necessary information required by Members. With regard to the educational department, he (Mr. Savage) thought it would be desirable for the Committee or the Council to consider whether they could or could not recognize the middle-class examinations in connexion with the objects of the Society. He thought a boy who had passed a major or minor examination at Oxford or Cambridge should, without further examination, be admitted as a Registered Apprentice, and considered qualified from that position to become an apprentice to a Pharmaceutical Chemist.

Mr. Squire said it was already done. The Council recognized the middle-class examinations in Chemistry and Latin.

Mr. Savage said he was glad to hear it. He referred to the remarks made by the President relative to the late Mr. Bell, and observed that his efforts to forward the interests of Chemists and Druggists at large called for their best thanks; and no one could regret more than he (Mr. Savage) did, the loss the Society had sustained in Mr. Bell's death. He concluded by moving, "That the report now read be received and adopted, and printed in the Transactions of the Society."

Mr. Humpage seconded the motion.

Mr. Vizer said, that as great alterations were taking place with respect to the laboratory for the education of students, he wished to know whether the Society would receive corresponding pecuniary profit for the money they would expend. They were told that the alterations would cost the sum of £2000, and in looking over the financial statement he found the sum of about £50 was received as lecture fees from the students, whilst on the other side there was a charge of £550 for the Professors of Chemistry and Botany. He considered that the Society ought to derive some pecuniary benefit for this great outlay of money. Large numbers of students annually passed through the laboratory, and also passed their examination; and he could not help again repeating, that some pecuniary advantage should be derived therefrom by the Society. He could speak with pleasure and confidence of the exertions of the professors, and the great advantages that were derived from their instructions. He was aware the expenses connected with the laboratory were not included in the balance-sheet, but as the laboratory was looked upon as part and parcel of the Society, he thought the Council would agree with him in thinking that the income and expenditure in connexion with it should regularly appear in the accounts. He was an advocate for liberally rewarding the professors. He expressed his regret that so few Members were present at the meeting, and concluded by again urging upon the Council the suggestion he had thrown out.

Mr. Collins, referring to Mr. Bell's bequest of £2000 to be devoted as the Council might think best to advance the interests of pharmacy, said that he presumed the Council considered themselves justified in appropriating the money in the manner they proposed, as most likely to agree with the wishes and intentions of the donor; but he considered it would have been more courteous and graceful on their part to the Members if they had called the latter together at a public meeting, and there have detailed the plan, and consulted them upon it before they commenced proceed-

ings; not but that he knew the Council had an undoubted right to act as they had done. He had been for some time past staggered when the question had been put to him of what use was the Pharmaceutical Society to the great bulk of the chemists and druggists of the country? The greater portion of their contributions was expended in a manner not contemplated when the Society was first established. The object at starting was the protection of the various Members of the body corporate, and not for the Society to sink as it had done into a mere academy. He considered that the Society had made a great mistake in this attempt to combine the office of an examining body with that of an educational one, and was of opinion that the Legislature would never sanction them on that account. He thought they should devote themselves to examination, and allow students to get their education where they pleased, as was the case with the London University, which left to the Colleges the duty of education, and only granted degrees. The Pharmaceutical Society aspired to give certificates to those qualified in Pharmacy and Materia Medica; but any man could call himself a chemist without education, so that the Society had failed to remedy this state of things. This would be much more in accordance with the design of the founders than was the attempt to keep up a school, the attendance at which was never large. He understood there were rarely more than fifty or sixty at the lectures, and still fewer in the laboratory. He thought the Council would have done better by confining themselves to the examination of candidates for their diploma, instead of committing themselves, as they had done, to the support of an educational system, because he felt certain Parliament would never let them combine the two. The Council ought to endeavour, as far as possible, to obtain for the Members of the Society such a recognition as would place them in their proper position as the accredited vendors and compounders of medicines in this country. He complained that the ballotting papers had been sent out without any indication of the number of attendances of the members of the Council, contrary to the instructions of a former meeting. It was desirable that the Members should have an opportunity of ascertaining whether the Council attended to the business of the Society. On a previous occasion, when that suggestion was complied with, it was found that one gentleman had not attended one of the Council meetings, consequently his name was scratched. That gentleman had been a member of the Council, and was to be re-elected by virtue of his "star;" but if gentlemen were ambitious of their "stars," they must also put up with the "stripes." The election of the members of the Council naturally devolved upon the country Members from their numbers, and they ought to be in possession of the best information relative to the attendance of the various members of the Council.

The SECRETARY said the information referred to was published monthly in the Journal.

The PRESIDENT said the instructions referred to by Mr. Collins had been overruled, and the information was now given monthly.

Mr. COLLINS said, there appeared to be a tendency on the part of country Members to elect from their body on the Council. On principle he did not object to it, because it would not do for the town Members to have it all their own way; and, in the next place, to have all town Members on the Council would be throwing too much work on them; but he doubted if the country Members did a corresponding amount of benefit for the Society in a year for the £140 charged for travelling expenses. The profits of the Journal were not mentioned in the balance-sheet, though there were expenses in connexion with it charged. He had been told that it gave an annual profit of £500.

The SECRETARY said there was a small sum from last year inserted in this balance-sheet.

Mr. COLLINS asked if the Journal gave some profit last year.

The PRESIDENT said it was not their property then.

Mr. COLLINS said he wished them "God speed." He saw many grey heads amongst the Council, and with the infusion of some younger blood he had no doubt they would go on very well.

Professor REDWOOD said it was important, as the subject of the laboratory had been raised, that he should give the meeting some information with reference to it, which he was probably in a better position than any one else to do. Mr. Vizer and Mr. Collins appeared to be of opinion that all the fees for the laboratory as well as

the lectures should be accounted for in the financial sheet, and also the expenditure connected with those departments; but those gentlemen had overlooked the fact, or at least had not mentioned, that about six years ago that practice, which previously existed, was relinquished, in consequence of the expenditure being generally in excess of the receipts. From the first establishment of the Society it was felt that the weak and vulnerable point in the then existing body of Chemists and Druggists was that which affected their professional education and qualification. One certainly of the principal objects contemplated by the originators and earliest promoters of the Society was to provide efficient means for supplying the scientific knowledge required by Pharmaceutical Chemists, for which at that time there was no provision whatever in this kingdom. Arrangements were made from the first for the delivery of lectures, and for otherwise diffusing Pharmaceutical knowledge. A system of examination was also established, which was called for by the medical profession and the public as a test of qualification; but to attempt to carry on such examinations in the absence of any means of supplying the required knowledge to those who were to be examined, would have been a mere farce. Every one at that time felt that such would be the case, and consequently one of the first acts of the Society was to organize a school for the instruction of pharmaceutical students. For many years the expenses connected with this school, including the laboratory department, formed an item in the annual financial statement. It happened unfortunately, however—although in this respect the result was quite in accordance with the experience of other similar establishments—that the expenditure always far exceeded the receipts, and the consequence was that the Council, operated upon by a pressure from without, were induced to relieve themselves of part of the pecuniary responsibility connected with the school. He had held the position of one of the Professors to the Society from the first establishment of the school, and had always had the direction of the laboratory. In the first instance, the Professors were paid in accordance with the rate of remuneration elsewhere, and all the fees, which were higher then than now, were received by the Council. But when a change was called for by the Members in consequence of the heavy expense entailed on the Society by the school, not only were the expenses of the lectures curtailed, but those of the laboratory were entirely removed. It then became a question as to how, and by whom, the laboratory course of instruction should be carried on, and an arrangement was come to with the Professor, who undertook to carry it on at his own risk. That arrangement had now existed for several years, the Professor, without taking the remuneration for his services into account, sometimes making a small profit, and sometimes suffering a loss; and hence the reason that the receipts and expenditure of this department had not recently appeared in the financial statement of the Society. If they had appeared there, as of course, in that case, the Professor would have received a fair remuneration for his services, the balance would not have been on the most favourable side of the ledger. Now, two statements had been made to the meeting by the two last speakers, which, although they appeared to coincide in some respects, were nevertheless diametrically opposed to each other. Mr. Vizer was for making the school a source of profit; he seemed to think the Society ought to get some pecuniary benefit from the laboratory, while Mr. Collins, on the other hand, contended that the less the Society had to do with education the better. He (Prof. Redwood) thought that both these gentlemen were wrong. If the Society made the school a source of profit, they would, he thought, place themselves in a very equivocal position with reference to the exercise of the power they claimed, and which had been conferred upon them by the Legislature, of examining Pharmaceutical Chemists and granting certificates of qualification. At present they could not be charged with any interested motives, for the school was simply a burden to them, which was only borne because it could not be otherwise supported. So completely did the Council act upon this principle, that when they divested themselves of the pecuniary responsibility connected with the laboratory, they, at the same time, altered the scale of fees for attendance at the lectures, making the attendance free to all the Members, Asscciates, and Registered Apprentices of the Society, and imposing a mere nominal fee upon those who did not belong to the Society. No person, therefore, could say that the Society had any pecuniary interest in favouring those candidates at the examinations who had attended their own school.

They maintained the school as a public duty, feeling that they were called upon and expected to provide the public with a class of well-qualified Pharmaceutists, who had been tested by an efficient examination, and feeling at the same time that this object could not be carried out without an efficient school. The Society gained no pecuniary advantage from the school, it was impossible that it could be made a source of profit in that way, nor did the Council think that such ought to be looked for. Mr. Vizer wished to know what the Society gained by the school. He would tell him that they gained the advantage, and the credit in public estimation, of having Members like Mr. Vizer, who, having passed through a systematic course of instruction and a strict examination, were well qualified to perform the responsible duties of their profession. This was the legitimate advantage which the Members of the Society were justified in looking for, and he thought it was the only safe position for the Council to assume in reference to education, while they exercised the high functions of an examining board. The school was an essential part of the system adopted for promoting the extension of pharmaceutical knowledge, and supplying a class of qualified pharmaceutists, and until the instruction given in this school was provided in some other way, the Council of the Society felt that it was part of their duty to make such provision. Mr. Collins had made some remarks on the small attendance at the school, but this could only have arisen from want of correct information. The fact was, that the attendance at the lectures and in the laboratory was every year increasing, and during the present session it had been such that they had much difficulty in accommodating all the pupils. He knew of no school of a similar description better supported in regard to numbers, and the great increase in the laboratory class had first suggested the extension of the laboratory accommodation which was now being carried out. This had probably also given rise to the idea that some great profit must be made from the laboratory, which, like the statement made by Mr. Collins with reference to the profits of the Journal, was a delusion. No such profits would be found in either department, but at the same time he was not prepared to say that it might not be right for the Council again to place themselves in the position they formerly occupied with regard to the laboratory, now that it was becoming less likely to be a source of loss, and was rising, not only to the top of the house, but also in the estimation of the public. Those who objected to the part taken by the Council in promoting pharmaceutical education ought to be able to show how such education could be otherwise carried out. When other suitable means were provided, the Society could, and no doubt willingly would, relinquish that part of their duties. But such education could not, he believed, be made self-supporting. If the school were to be given up by the Society, one of two things must happen: either another Society would have to be established, to carry out and support that object; or, in the absence of it, the great purpose for which the Pharmaceutical Society had been formed would be frustrated, and the Society itself would inevitably come to nothing.

Mr. Humpage was glad that Mr. Collins had made the remarks he had, because they had called forth a reply that would be satisfactory to all concerned. The men who had taken the trouble to inquire minutely into the details, and had ascertained the actual working of the Society, were best satisfied with it. When he subscribed his two guineas at the commencement of the Society, he never expected to receive a money satisfaction, but that through the funds collected they would be able to establish a standard of professional education that would raise them as a body, not only in the estimation of the profession, but in that of the public generally; and if they compared the body now with what they were seven or ten years ago, he thought they must acknowledge that it had been accomplished. It was for some time a problem whether they would ever succeed—many believed not—in bringing a large number of the Chemists and Druggists together, but through the indefatigable exertions of Mr. Bell, the problem had been solved; and if they but persevered, the Society seven years hence would occupy a superior position to what it now did. They had only to give up little minor differences, and work together for the general good, and success must inevitably follow.

Dr. Edwards said the Council, although they did not receive the fees of the laboratory, were not in ignorance of what was done. An account was rendered to them, and they were fully informed upon the subject.

Mr. Waugh said the professors did not claim a monopoly of professional education. If other schools were established, it would be competent for young men to attend them, and then come to this Society for examination. The Society's school was established because there was no other in existence, and were there an abundance of such schools it would considerably lessen the labours of the Council. The young men might go where they pleased to acquire information, but he thought they would show sound good sense in coming to the Society, where the arrangements were so perfect, and all under one roof.

Mr. Squire assured Mr. Collins, that so far from the Government not recognizing the Society's examinations, they would only have assistants for the army who had passed them successfully. A recent case had occurred. A young man who had passed Apothecaries' Hall was sent to the Society for examination before receiving his appointment to start for India. The case was urgent—the ship was about to sail; but he was found so lamentably deficient that the examiners could not pass him conscientiously, and consequently he was "plucked." He was found deficient in the department for which he was more especially sent to them for examination—viz. dispensing, which was so requisite in the army. Having so important a duty to perform, they were bound to discharge it in a proper manner.

Mr. Deane said it was not the desire of the Council to derive a pecuniary profit from the application of the funds of the Society, but to so judiciously administer them that a profit should attach to each individual in the advantages he would derive in after years from the professional education and examination he had passed through before becoming an associated Member. Any one who supposed that the Council were not alive to the interests of the Society, or did not discharge their duties in accordance with the intention of those who founded it, because they did not make a direct pecuniary profit, were under a serious misapprehension with regard to the duties that devolved upon the Council.

Mr. Allchin wished to ask Professor Redwood if he knew of any public institution, such as that, in which arrangements for providing professional education were made a source of pecuniary profit ?

Dr. Redwood said that he had made many inquiries, and the universal experience, so far as he had been able to ascertain, was that the expenses exceeded the receipts.

Mr. Vizer said he had derived great benefit from the system of education adopted by the Society, and he would be the last man to say a word against it. All he had said was, that if the Society bore the expenses of the laboratory, it ought also to derive any advantage resulting from it.

Mr. Waugh said the Society had, during last year, received £455 as fees from Pharmaceutical examinations in consequence of the school. Surely that was an advantage. He was ashamed, when he heard gentlemen ask what they got for their guinea subscription. He considered it was a great mistake when they reduced the subscription from two to one guinea. He thought they got plenty for their money in journals, lectures, &c.

Mr. George Edwards said there were no grounds for them to expect a direct pecuniary return for the money they laid out in connexion with education, but no one could deny that they gained other advantages by giving a character to their profession which it would not otherwise possess, and individuals were enabled to turn this to pecuniary profit to a greater or less extent, if they took advantage of all that the Society provided. It was in this way only the Members should look for a return for their money, and therefore, when Mr. Vizer asked, what did the Society get from the laboratory ? he had been rightly told that it got men like himself, who reflected credit on the profession, and contributed to raise the body of Pharmaceutical Chemists in the estimation of the public, and to secure the confidence of the public and of the medical profession. This, too, was the most effectual way of securing the protection which Mr. Collins had referred to, for in proportion as the number of educated and qualified Members in their body was increased, there would be better security against legislative or other interference with the interests of their profession. In any other sense than this he did not think there was any probability of their obtaining what some Members seemed to be looking for, namely, legislative protection, or the exclusive right to sell and dispense medicines. The tendency of modern legislation was in the direction of free trade, and they might as well expect

to get a slice of the moon as "protection." All they could do was to found such a system of education and examination, in connexion with their profession, as would inspire the public with confidence, and then they would have nothing to fear. Before concluding, he wished to say a few words with reference to the Benevolent Fund. This was a feature in their Institution which he thought it very desirable they should not lose sight of, and he wished and hoped to see its applications extended. It would have gratified him to have found a reference in the Report to the good done by the distribution of this Fund—to cases in which it had relieved distress, and contributed to wipe away the tear from the widow's eye. He hoped the Fund would continue to increase, and as it became more generally known, that it would be more frequently appealed to. In conclusion, he passed a well-merited eulogium on the career, and referred with much feeling to the last moments, of the late Mr. Bell, and observed that in Landseer's sketch at one sitting, taken only a few days before Mr. Bell's death, they had a marvellous creation of the man, which they would all highly prize.

Mr. Herring said he could assure the Members that the education afforded by the Society was now very considerably recognized. He was repeatedly asked to recommend young men as assistants who had been professionally educated by the Society. The words "Pharmaceutical Chemist" were beginning to have an effect upon the public, and were considered as a surety for the proper discharge of their functions in the persons who had a right to the title. He felt much gratification at knowing that they were now being looked upon as a body of enlightened men, combining together for the improvement of their business and the protection of the public.

Mr. Macfarlan expressed his satisfaction at the course the discussion had taken, because it showed that they were pursuing a proper line of conduct. He spoke of the great advantages the Society had already conferred on the profession, and expressed an opinion that they would be greater for the future. He also spoke in affectionate terms of the late Mr. Bell, and the great desire he had when alive of promoting the professional education of the body.

Mr. Stanford said the advantages of the education afforded by the Society had, he thought, been underrated by some of those who had addressed the meeting. He could not but think that Pharmaceutical education was a most important branch in connexion with the Society, because it was useless to attempt to give a man position as a Chemist without the requisite professional knowledge. The Report they had heard read, notwithstanding the gloom cast over it by the shade of their departed great labourer, still showed that he had not left them before he had infused his own restless energy and untiring perseverance and noble spirit into those he had left behind him in the Council. As a young man, and the son of one of the founders of the Society, he (Mr. Stanford) had tasted of the advantages the education provided by the Council offered, and he desired particularly to express his gratitude to them for the manner in which they had planted this tree of knowledge that had taken already such deep root in Bloomsbury Square, the branches of which had extended through the length and breadth of the land, and would speedily have good and full fruit.

Mr. Savage referred to the want of energy displayed by some of the local secretaries. In many cases the Members had to take the initiative; and he expressed an opinion that if those gentlemen could not attend to their duties, it would be better for them to give place to those who would.

The President then put the resolution, which was agreed to unanimously.

Mr. Bower moved, and Mr. Buckle seconded, in complimentary terms, the thanks of the meeting to the members of the Council for their valuable services during the past year.

The resolution was carried unanimously.

Mr. Squire returned thanks, in the course of which he said he should be sorry to see anything that would tend to disturb the harmony that at present existed in the working of the Council. They were all animated with a desire to benefit the profession, individually and collectively.

The thanks of the meeting were then unanimously and cordially voted to the President, who, in returning thanks, feelingly alluded again to the loss of Mr. Bell, and in reference to the laboratory, said the Council believed they were acting in

accordance with Mr. Bell's wish in expending money upon it. It was always a subject of conversation with him, and he had on many occasions estimated the cost of what was required to be done at £2000, the very sum he had left them for such purpose.

Mr. Lescher reminded the meeting that the subscriptions for the Bell memorial, in the shape of scholarships, had not reached the desired amount, and he urged on all the Members to exert themselves to raise the required balance.

The meeting was then adjourned till Friday, to receive the scrutineer's report relative to the election of the Council and the auditors.

ADJOURNED MEETING,

Friday, 18*th May*.

MR. MORSON, PRESIDENT, IN THE CHAIR.

The Scrutineers brought up their Report, as follows :—

We, the Scrutineers appointed at the Nineteenth Annual General Meeting of the Pharmaceutical Society, do hereby certify that we have duly examined the voting papers committed to us, and report the following results:—

Voting papers allowed	594
Disallowed for informality ...	7
	601

Bottle	394	Deane	508	Hitchcock	298	Peacock	182
Bower	191	J. B. Edwards .	494	Hollier.....	328	Squire.....	526
Brady	318	Evans	377	Hopwood	280	Standring ...	456
Bucklee	448	Herring	472	Macfarlan	541	Watts	239
Davenport ...	482	Hills	399	Morson	530	Waugh	466

(Signed) Benjamin M. Tippett, *Chairman* — John Barnard
Christopher F. Buckle — G. B. Francis
Thomas Binge — Samuel Gale
Richard Kemp — Walter Breton
Joseph Kettle — John W. N. T. Brewer
Edwin B. Vizer — Edward C. C. Stanford

The following Members were therefore declared to constitute the Council for the ensuing year:—

COUNCIL.

Bird, William L., 42, Castle Street, Oxford Street
Bottle, Alexander, 37, Townwall Street, Dover
Bucklee, William H., 86, New Bond Street
Davenport, John T., 33, Great Russell Street
Deane, Henry, Clapham
Edwards, George, Dartford
Edwards, John Baker, Liverpool
Evans, Henry Sugden, Liverpool
Hanbury, Daniel Bell, Plough Court, Lombard Street
Haselden, Adolphus F., 18, Conduit Street
Herring, Thomas, 40, Aldersgate Street
Hills, Thomas Hyde, 338, Oxford Street
Hollier, Elliott, Dudley
Lescher, Joseph Sidney, 60, Bartholomew Close
Macfarlan, John F., 17, North Bridge, Edinburgh
Meggeson, George, 61, Cannon Street
Morson, Thomas N. R., 38, Queen's Square
Sandford, George Webb, 47, Piccadilly
Squire, Peter, 277, Oxford Street
Standring, Thomas, 1, Piccadilly, Manchester
Waugh, George, 177, Regent Street

There being only the requisite number of Candidates proposed for election as Auditors, they were declared to have been elected as follows:—

AUDITORS.

BARNES, JAMES B., 1, Trevor Terrace, Knightsbridge, W.
CONSTANCE, EDWARD, 37, Leadenhall Street, E.C.
FARMER, ROBERT, 40, Westminster Road, S.
HILL, ARTHUR BOWDLER, 11, Little Britain, E.C.
HUMPAGE, BENJAMIN, 44, Chancery Lane, W.C.

After the usual votes of thanks to the Scrutineers and to the Chairman, the meeting terminated.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Fifteenth Meeting of the Session was held in the Royal Institution, Colquitt Street, on April 26th,

THE PRESIDENT IN THE CHAIR.

Mr. Benjamin Dickins was elected a member.

The SECRETARY read a letter he had received from Dr. Dickinson, in which he expressed his hearty concurrence and desire of co-operation in the proposed Natural History Club, and offered half a dozen copies of his *Liverpool Flora and Supplement*, for the use of the club. A vote of thanks to Dr. Dickinson for his very liberal offer was carried by acclamation.

The PRESIDENT announced that the successful competitor for the first prize, "Miller's Chemistry," was Mr. Preston, apprentice to Mr. Britten, Haymarket; the second prize was awarded to Mr. Wade, apprentice to Mr. T. D. Walker, Ranelagh Street, and the selected book was *Christison on Poisons*. He was much gratified by the diligence and intelligence manifested by the pharmacy class during the past session.

The lecture for the evening was delivered by F. D. FLETCHER, Esq., M.R.C.S., "On the Chemistry of Digestion," of which the following is a short abstract:—

The lecturer commenced by referring to the necessity which existed for the constant supply of new material to the organization, in consequence of the expenditure of substance involved in every action of life, stating that all materials which are either worked up into the tissues of the body, or expended in the production of heat, must be considered as food.

Of these materials a large number, such as water, alcohol, chloroform, and many soluble salts, might be absorbed immediately into the blood without undergoing any appreciable change; but that most organic substances required to undergo some process of transformation before it became possible that they should pass into the blood, and thence into combination with the tissues in general, and this process is digestion.

Without asserting any division into heat-making and tissue-making elements, we recognize important differences in alimentary substances themselves, necessitating the use of different reagents in the process of solution which they must undergo; that a different process is required for the solution of fats and of amylaceous substances, though both belonging to the group of hydrocarbons; and again the processes for the solution of the nitrogenous elements.

In the first stage of the digestive process, that of mastication and mixture with saliva, two purposes are fulfilled—the disintegration of the food so as to expose it to the action of the fluids with which it meets, and to soak this disintegrated mass, thus rendering the passage of the digestive fluids through the whole of it more easy. The first digestive fluid, *the saliva*, serving mainly mechanical purposes—the more watery portion furnished by the *Parotid* gland facilitating mastication—the more viscid furnished by the submaxillary and the sublingual, serving to lubricate the surface of the food, and thus aid in the process of deglutition, the sole chemical power possessed by this fluid being that of changing starch to sugar and possibly to lactic acid.

The second digestive fluid, *gastric juice*, furnished by the glandular apparatus in the mucous membrane of the stomach, acts on nitrogenized elements, especially its extractive matter. Pepsine acting as a ferment, and disposing the materials with

which it is brought into contact to change; its acid, the hydrochloric, serving there as the agent which carries on the process of solution. The stomach itself being protected from the effects of the gastric juice, possibly by its epithelium, more probably by its mucus. The contents of the stomach, reduced to a semi-fluid mass, then pass into the first portion of the small intestine (the duodenum) and there meet the pancreatic fluid and bile combined.

The pancreatic juice, whose activity depends probably on an albuminous ferment acting on starch, changing it to sugar or fat also; these being not simply emulsified, but converted into a fatty acid and glycerine, and possessing, also, the power of dissolving the nitrogenous portions of food. The bile, which arrests digestion instantly when regurgitated into the stomach, possessing only slight emulsifying power with regard to fats, exerts no influence over fresh starch, has no action on nitrogenous compounds, but possesses the power of checking fermentation and putrefaction; appears by its presence to stimulate the intestinal glands to their secretion, and very probably plays an important part in the absorption of fatty matter from the intestine, since oil, which requires considerable pressure to force it through animal membranes, passes very readily if the membrane be moistened with bile.

The intestinal juice furnished by the glands surrounding the commencement of the small intestine, and by the glandular follicles of the intestine itself, act on starchy and nitrogenous elements as well.

The nutritive material passes into the blood in two ways:—First, through the absorbent vessels of the intestine, the lacteals to the thoracic duct, and thence into the blood—a considerable quantity of fat being thus conveyed; and second, through the capillaries of the blood-vessels of the intestines, all of which transmit their contents to veins which convey the blood from the intestines to the liver.

The changes which the blood undergoes in this organ are still obscure, but one phenomenon has been recognized as constant in the healthy liver—the production of sugar at the expense of the fibrine of the blood.

The PRESIDENT, in commenting upon the lecture which they had just heard, said that a number of very interesting questions presented themselves, more especially in reference to the progress of digestion and assimilation during sleep, as to whether these went on uninterruptedly.

A short discussion ensued, after which the President proposed a vote of thanks to Mr. Fletcher, and the proceedings terminated.

Royal Institution.

The Sixteenth Meeting of the Session was held on May 10th,

THE PRESIDENT IN THE CHAIR.

The following donations were announced:—The *Chemist and Druggist*, from the Proprietor; the *Pharmaceutical Journal*, from the Society; a Condenser for the Microscope belonging to the Association, from Mr. H. S. Evans; the Root of *Hydrastis canadensis*, or Golden Seal, from Mr. J. Shaw.

The CHAIRMAN, in opening the proceedings, said, in reference to the late prosecutions for the *Adulteration of Pepper:*—The conflicting scientific evidence had given an unusual interest to these cases; three microscopists and three chemists had given negative testimony, while three microscopists and six chemists had certified to the adulteration. If the theory of the prosecution was correct, the guilty parties had escaped by the fallacies of scientific evidence, while the innocent suffered by the glorious uncertainty of the law, the latter parties being heavily fined under the politest protestations that they were perfectly free from all suspicion or blame, and the comfortable assurance that the only suspected parties were those who had already escaped. He considered these cases had an important practical bearing upon the prospects of the Food Adulteration Bill now before Parliament, which had already passed through committee in the House of Commons, and which he read. In the first place, it was obvious that a certificate of purity was the quietest and easiest *quid pro quo* for the fee. In the next place, it ought to be known that the detection of adulteration depended a good deal upon the amount of time, knowledge, patience, and ingenuity directed to that end. A uniform and inadequate fee would therefore be greatly in favour of a cursory and insufficient examination, terminating in a certificate of purity

worth nothing at all. The appointment of inefficient or ill-paid analysts under the provisions of the bill could therefore lead only to disappointment and litigation. The public would not be protected, nor would the tradesman obtain jutice. If the question was of sufficient importance to become a national one, he considered that the Government should appoint a board of central analytical commissioners, who should endorse or veto every local appointment; and a staff having been properly organized, it should be its object not only to convict offenders, but to give publicity to every known sophistication, and to the means of its detection. Every local trial should be supported by one of the chief analysts, in addition to the local officer, and a common basis of operation should be agreed upon and disseminated. Individual caprices and local prejudices would then give way before a general and approved system, and many of the secret modes of clever manipulation would become common property for the benefit of the public. The present mode of hiring scientific witnesses on both sides was open to the gravest objections, and it was high time that the subject should be fully discussed and placed on a more satisfactory basis. The claims of a witness to belief often now rested on an assumed qualification, while real merit might be overlooked. A cautious, intelligent, but nervous witness became baffled under a cross-examination, which gave fine opportunities of display to the confident and not over-scrupulous man who happened to be at home in the witness-box. A nicely-balanced corps of scientific evidence is the most puzzling case for a jury to try, and is seldom satisfactory to either side. We have it on record that in such a case the judge has found it necessary to charge the jury to forego all the scientific evidence, and exercise their common sense. This is a sad blow to science, and it behoved scientific men to adopt well-concerted measures for the establishment of the truth, of the whole truth, and nothing but the truth.

As introductory to Mr. Evans's paper for the evening, the President handed round some excellent drawings of pepper and mustard tissue, which had been executed for the microscope, under the direction of Mr. George Phillips, superintendent of the Inland Revenue laboratory at Somerset House, and kindly lent for publication.*

ON THE MICROSCOPIC STRUCTURE OF PEPPER AND ITS ADULTERANTS.

After briefly sketching the origin and varieties of pepper, Mr. Evans proceeded to describe the various cellular structures composing the pepper berry, from highly magnified drawings he had prepared for the purpose.

The first, or external coat or cuticle, consists of a very thin membrane composed of a single layer of thin flattened cells, amongst which stomata of large and perfect form are discoverable. Beneath this membrane is a layer of thick-walled, irregularly-angular epidermal cells firmly imbedded in a cellular matrix. These cells are very characteristic, and form a coating of some thickness, superimposed on another, formed of large, loose, rounded cells, the original pulp of the berry. The walls of many of these cells are observed gradually thickening and hardening by the deposit upon their surface of sclerogen, and assuming the characters of the epidermal cells of the upper coat. These three coatings together form the husk of black pepper, which is separated from the next coat, forming the surface coat of true white pepper, by ramifying bundles of vascular tissue consisting chiefly of spiral vessels with a few fusiform woody cells interspersed.

The outer covering of white pepper, or fifth coat of black, is composed of several layers of loose cellular tissue, the cells having an irregular angular form, and filled with oil globules. Beneath this coat is found the so-called inner husk of pepper. It is composed of three membranes firmly adherent to each other, and is the testa of pepper seed. The first membrane consists of a single layer of very transparent, colourless cells, having very thin walls, and an elongated angular form filled with apparently granular matter. The second membrane appears to be structureless, is deeply coloured, and imparts its colour to the over and underlying membrane, to both of which it is firmly adherent. The third membrane is composed of dense hexagonal cells, having thick walls. A granular matter fills the cell, but without colour. Beneath this is the substance of the seed, composed of innumerable angular

* Carefully engraved copies of these will be given in our next number.—Ed.

loose cells rather large, with very thin, deeply-pitted walls. Many of these cells are filled with minute starch grains varying from the $\frac{1}{3000}$th to the $\frac{1}{5000}$th of an inch, of irregularly rounded or truncated form, having a decided central depression. Other cells contain piperine, albumen, and acrid resin.

In ground pepper all these structures are present, but variously mixed, and to a certain extent distorted. Their examination requires the use of reagents, the operation of which Mr. Evans described.

The adulterants of pepper are various. The cereal starches are frequent, and all these Mr. Evans described by the aid of excellent drawings, and were most readily distinguished from pepper starch, with the exception of rice. The size of rice starch grains is very nearly the same as pepper starch. Dr. Pereira gives the average size as $\frac{1}{5263}$rd part of an inch. The greater angularity of the individual grains, and the persistence with which they adhere to one another, forming almost inseparable groups, sufficiently determine the presence of this adulteration. Other starches, such as potato, sago, arrowroot, &c., were demonstrated by Mr. Evans to be most readily detected by the size and form of the granules.

Mustard husk, both brown and white, are frequent adulterants, particularly the latter. When coarsely ground their presence is readily detected by the simple microscope, but if in a state of very minute division it is not so simple. Nevertheless the structure is very characteristic.

The outer coating of the white mustard husk consists of a membrane of hexagonal cells, within each of which is an elastic spiral tissue, that opens out when moistened, reminding one of a nightcap or cap of liberty, with a tassel at the top. These cells are very characteristic, and by polarized light form very beautiful objects. Beneath this is a membrane of irregular hexagonal cells, superimposed on a membrane consisting of much smaller angular cells with very thick walls. In white mustard these are colourless, but in the brown are deeply coloured of an orange-red colour. These two tissues it is difficult to separate, and their combined appearance is very characteristic. The structure of brown mustard husk is very similar, but there is an absence of the nightcap cells, and in their place a layer of large loose rounded cells without any spire.

Mr. Evans next described the structure of linseed and capsicum pod and seed. The latter being frequently used as an adulterant, may be known by the very peculiar contorted membrane composing the testa, and the regular hexagonal cells of the substance of the seed, filled with oil globules.

In conclusion, Mr. Evans, referring to the general question of adulteration, said, that the public was ever ready, on the discovery of any flagrant case of fraud, to cry "Shame, shame!" and to rush to the law to put down by its potency the supposed cause of the evil; but the public never takes the trouble to investigate the true cause. Never perhaps was adulteration more rife than at the present moment, and yet the means for its detection are more patent than ever. The question is, who is responsible? and it resolved itself, in Mr. Evans's opinion, into a question of demand and supply, the responsibility resting with those who created the demand. There is at the present moment a morbid demand in every branch of industry for cheapness. Competition will supply this demand, and, being unnatural, it must be supplied at the cost of purity. So long as the public cry is for *cheap* goods, it must not be surprised if it receives an adulterated article, and therefore, before legislation can effect any good, society must reform itself, and learn that for a genuine pure commodity a fair and honest price must be paid. Mr. Evans instanced many of the schemes competition designed for pandering to this propensity of the public for great bargains, and he considered it should be made a personal matter with every one as to how far he participated in the responsibility of the evils of adulteration and sophistication, by allowing himself to be duped by these tempting allurements.

Dr. Edwards stated, that he had found oil of vitriol applied to the coarser granules was the best test for the direct discrimination between pepper and mustard tissue; the former poured forth a red colouring matter, which obscured the tissue for some time, but eventually faded away, while the latter became speedily and characteristically developed, and its structure, when observed under the microscope, was then unmistakable.

A number of excellent microscopes, with sections of pepper and mustard, and

various starches under view, were placed on the table, and a considerable amount of interest in the examination of them was evinced by the audience. The attendance of members was large, in addition to which there were present a number of strangers, including several gentlemen connected with the Excise department.

ORIGINAL AND EXTRACTED ARTICLES.

BASSIA FLOWERS.

Few trees have economic applications so numerous and so important as the Bassia trees of India. The wood of *Bassia longifolia* L. is hard and durable; its bark and leaves are used by the natives in medicine. Of the fruit, ripe or unripe, the skin boiled to a jelly is eaten with salt and capsicum. The ripe kernels afford an oil which is employed for culinary purposes as well as for lamps, for soap-making, and in medicine. The flowers, which are produced in immense quantity, are gathered as they drop to the ground, and eaten as good food, either raw or roasted or boiled to a jelly.

These valuable properties are shared to a great extent by *Bassia latifolia* Roxb., a closely allied species also abundant in India. The flowers of this species also serve as food to both man and animals. They are used likewise for the preparation of an alcoholic spirit which is obtained from them by distillation. "This flower," says Dr. Alexander Gibson, Government Conservator of Forests in Bombay,

> "is collected in the hot season by Bheels and others, from the forests, also from the planted trees, which are most abundant in the opener parts of Guzerat and Rajwarra. The ripe flower has a sickly sweet taste, resembling manna. Being very deciduous, it is found in large quantity under the trees, every morning during the season. A single tree will afford from 200 to 400 pounds of the flowers. The seed affords a great quantity of concrete oil, used in the manufacture of soap. The forest or Bheel population also store great quantities of the dried flowers as a staple article of food; and hence in expeditions undertaken for the punishment or subjection of those tribes when unruly, their bassia-trees are threatened to be cut down by the invading force, and this threat most commonly ensures the submission of the tribes.
>
> "In Guzerat and Rajpootana, every village has its spirit-shop for the sale of the distilled liquor from the flowers; in the island of Caranja, opposite to Bombay, the government duty on the spirit distilled (chiefly from this flower) amounts to at least £60,000 per annum; I rather think that £80,000 is most generally the sum. The Parsis are the great distillers and sellers of it in all the country between Surat and Bombay; and they usually push their distilleries and shops into the heart of the forest which lines the eastern border and hills of those countries. The spirit produced from the Bassia is, when carefully distilled, much like good Irish whisky, having a strong, smoky, and rather fœtid flavour; this latter disappears with age. The fresh spirit is, owing to the quantity of aromatic or empyreumatic oil which it contains, very deleterious, and to the European troops stationed in Guzerat some thirty years ago, appeared to be quite as poisonous as the worst new rum of the West Indies. It excited immediate gastric irritation, and on this supervened the malarious fever so common in those countries."*

Under their Tamil name *Elloopa*, the flowers of *Bassia longifolia* L. have lately been imported into London, we presume as an experiment to ascertain if they can find here any useful applications. The sample we have examined consists of fleshy corollas, of a ferruginous brown colour and moist appearance as if they had been preserved in sugar. They have a sweet taste, and an odour that

* *Note on the various Vegetable Substances used in India for the purpose of producing Intoxication. Hooker's Journ. of Bot.*, vol. v. (1853), p. 90.

reminds one of dried fruit. When steeped in water they regain their natural dimensions and are then seen to be 5 or 6 tenths of an inch long by about 4 tenths broad, and to consist of a thick and fleshy gibbous tube, bordered with eight small, thin, broadly lanceolate petals. Attached to the interior of the tube, and almost sessile are the stamens in a double row, numbering from 16 to 18.

D. H.

REPORT OF THE

RESULTS OF PHYSICAL AND CHEMICAL INVESTIGATION,

AND OF THE

APPLICATIONS OF PHYSICS AND CHEMISTRY IN THE ARTS.

On the Separation and Estimation of Phosphoric Acid.—M. Chancel has been engaged in the investigation of this subject, and has succeeded in devising what appears a very valuable process by which phosphoric acid may be precipitated in a perfectly definite form from an acid solution. He finds, in fact, that phosphate of bismuth is insoluble in liquids containing a considerable quantity of free nitric acid, while at the same time it is one of the most definite in composition of this class of compounds. If a solution of acid nitrate of bismuth (prepared in the manner described further on) is poured into a liquid containing a phosphate dissolved in diluted nitric acid, a very dense white precipitate is immediately formed, which rapidly subsides on the application of heat. A great number of analyses and experiments have shown that the composition of the precipitate so obtained is perfectly definite, and exactly represented by the formula (BiO_3, PO_5).

This neutral phosphate of bismuth is quite insoluble in water and nitric acid, either in the cold or at the boiling temperature. It is dissolved to a sensible extent by liquids containing ammoniacal salts. It is very readily collected, washed, and dried, and, as it is infusible at a red heat, it may be easily calcined. The recent investigations of Dumas have indicated 210 as the equivalent of bismuth; this neutral phosphate will therefore contain 23.28 per cent. of PO_5.

Bibasic phosphoric acid is also completely precipitated by the acid nitrate of bismuth. The precipitate, which must be formed in the cold, is more voluminous than the former, and shrinks considerably during desiccation.

Its composition is represented by the formula 2 Bi O_3, 3 PO_5'', in which the relation of the oxygen in the base to the oxygen in the acid is as 2 to 5. It is, therefore, a neutral pyrophosphate of bismuth, containing 31.28 per cent. of pyrophosphoric acid. If, however, when the precipitate is first formed, it be heated with excess of the acid nitrate, it is instantly and completely converted into the tribasic phosphate Bi O_3, PO_5, as is indicated by the change in the character of the precipitate. Metaphosphates behave in the same manner, but the precipitate requires longer boiling to effect its complete conversion into the tribasic form.

The precipitation of the phosphoric acid by this process is not only complete, but extremely delicate. The author has succeeded in separating one milligramme of phosphoric acid from 120 milligrammes of alumina, in a solution containing one gramme of free nitric acid. He considers that, in consequence of the rapidity with which the precipitate subsides when hot, the estimation might be made volumetrically, employing a standard solution of acid nitrate.

The reagent is to be made by dissolving with heat one part of pure sub-nitrate of bismuth (Bi O_3, NO_5 + Aq.) in four parts of nitric acid, sp. gr. 1.36, adding thirty parts of distilled water, boiling the solution, and, if necessary, filtering. The liquid should contain 10 or 12 equivalents of NO_5 to 1 of BiO_3.

In practice, this process affords a simple means for separating phosphoric acid from a mixture of bases. The substance is weighed, and, if insoluble in water, is heated with a sufficient quantity of nitric acid, avoiding a very large excess. When all is dissolved, the solution is diluted with distilled water, and the acid nitrate added as long as a precipitate is produced; the liquid is raised to the boiling point, filtered, and the precipitate washed with boiling water, dried, heated to redness, and weighed. The weight multiplied by 0.2328 gives the amount of phosphoric acid present in the

substance operated on. The bases which were present are readily estimated in the filtrate, after the excess of bismuth has been removed by sulphuretted hydrogen.

It is necessary in this process that all chlorides and sulphates be removed from the solution by means of nitrate of silver and nitrate of baryta previous to the addition of the bismuth reagent.

On a Combination of Chloride of Arsenic and Alcohol.—M. Luynes has pointed out that when chloride of arsenic is mixed with absolute alcohol, the temperature rises to about 70° Cent., and upon distilling the mixture a liquid is obtained boiling at 148° C., and which is a compound of chloride of arsenic with alcohol.

The same body may be formed by passing a current of hydrochloric acid gas through alcohol holding arsenious acid in suspension. The temperature rises, the arsenious acid is dissolved, and the liquid soon separates into two layers. The inferior portion, submitted to distillation, commences to boil at 96°, gradually rising to 148°, where it remains stationary. The liquid thus obtained is colourless, fuming in the air; it is decomposed by water into hydrochloric acid, arsenious acid, and alcohol. It absorbs a considerable quantity of hydrochloric acid gas, which is again liberated on the application of heat. Its composition is represented by the formula $C_4 H_6 O_2 + As Cl_3$. Methylic and amylic alcohols form similar compounds.

Solubility of Sulphate of Quinine in Saline Solutions.—M. Calloud has pointed out that the solubility of sulphate in quinine in water is increased by the presence of sal-ammoniac, nitrate of potash, and chloride of sodium, while it is diminished by the sulphates of soda and magnesia. Bicarbonate and phosphate of soda decomposes the sulphate of quinine entirely or in part. M. Calloud's experiments were made with eighty grammes of distilled water, one gramme of sulphate of quinine, and four grammes of each of the salts named. He states that pure quinine is readily dissolved by water containing a little sal-ammoniac.

Iodized Essence of Juniper.—M. Heller states that when iodine is introduced into essence of juniper (it should be added gradually and cautiously, to avoid too energetic an action), a brown solution is obtained, soon becoming colourless. The substitution product thus prepared has the formula $C_{20} H_{12} I_4$. It possesses the odour of juniper berries, unmixed with iodine; it does not act on starch, or stain the skin. Iodine is found in the urine, the saliva, and the nasal mucus of patients using it as a medicine.

On the Composition of Gutta Percha.—According to M. de Baumhauer, gutta percha at the moment it is obtained from the tree is simply a hydrocarbon, having the formula $C_{20} H_{16}$, and, therefore, isomeric with oil of turpentine. This hydrocarbon is readily affected by the air, and forms a series of oxidized products, of which the author has isolated two ($C_{20} H_{16} O$) and ($C_{20} H_{16} O_2$). This oxidation may proceed until it gives rise to the production of formic acid, a result which was obtained with some gutta percha in fine powder preserved in a bottle. It is to oxidation that is attributed the rapid alteration of objects in gutta percha which are not varnished.

The author preserves the name *gutta* for the hydrocarbon, which is prepared as follows:—Gutta percha is purified by water and hydrochloric acid, and then treated with boiling ether. Almost complete solution is effected, with the exception of some black flakes of tannin, which are separated by filtration. The gutta percha is deposited on cooling; it is pressed, and the treatment with ether repeated, until the cold mother liquor evaporates without residue. The solid product constitutes the *gutta*. At first insoluble in cold ether, it becomes soluble after exposure to the air for some time. It is further purified by washing with cold ether, then with alcohol, and heating in a water-bath. By the washing, the matter becomes gelatinous, the heat of the boiling water coagulates it. Dried at 100° C., the coagulum forms a yellowish transparent mass, containing 86.8 per cent. of carbon, and 11.72 of hydrogen. By treatment with boiling ether, repeated five times, the carbon is increased to 88, and the hydrogen to 11.8 per cent. Reduced to powder, gutta is white; it fuses at 100° C., and becomes transparent, at 150° it acquires a viscous consistence, and at 180° it is decomposed, giving off an oily liquid. At 210° it swells out, and is filled with bubbles of gas. Ozone strongly attacks gutta percha.

ON THE PROXIMATE ANALYSIS OF PLANTS AND VEGETABLE SUBSTANCES.

BY FREDERICK ROCHLEDER, M.D.*

(*Continued from page* 568.)

SECTION 3.—*Treatment of materials with various solvents.*

THE material mechanically prepared for the investigation should be divided into several parts, and each part treated with a solvent to obtain a number of extracts, which are to be submitted to a further examination.

The fluids most frequently used for a long time for this purpose are ether, alcohol, and water; the latter is often mixed with acids or alkalies. The ether is generally used in a perfectly pure condition, the alcohol mixed with more or less water, according to the strength of the spirit required. Experience has shown that water, after it has extracted bodies from a material which are quite soluble in water, also possesses the power of dissolving substances, as already mentioned, which are either insoluble, or difficultly soluble *per se* therein. This disadvantageous circumstance occurs less with alcohol, and still less with ether. In consequence, it has become a general rule to treat the material first with ether, then with alcohol, and lastly with water, when it is intended to treat it with these three solvents. I have found it the most convenient to extract a portion of the material with hot water, another portion with cold water, a third portion with acidulated water, a fourth portion with ammoniacal water, a fifth portion with alcohol, and to treat a sixth portion with ether. In peculiar cases, a treatment with alcohol containing ammonia or potash is suitable. The preparation of these solutions, as well as the precautions to be thereby observed, will here be more minutely discussed.

I.—*Treatment of the substance under examination with boiling water.*

The treatment with boiling water, as previously stated, should afford us a decoction and a distillate, of which the former will contain the non-volatile constituents and the non-volatile compounds of the volatile bodies in so far as they are soluble in water, the latter the volatile, or rather the constituents, distillable with water, of the material. For the treatment of the material under examination with water, an ordinary still is required. The still, which must be sufficiently capacious, is filled with the water intended for the extraction of the material, and this is heated to the boiling point. When the water boils, the material, suitably divided, is thrown into the water, the receiver adjusted, and proper care taken for its refrigeration. To introduce the divided material carefully into the boiling water, and to prevent as much as possible burning, I employ an apparatus which I will in a few words here describe. This consists of a cylinder, open at the top and closed at the bottom, made of tinned iron plate. The sides and the bottom of the cylinder are perforated with holes, so that the cylinder represents a coarse sieve. Externally, at the bottom, three short feet are attached, and a cover of tinned iron plate, likewise perforated, closes the cylinder in which it is inserted, being in diameter about two lines less than the cylinder. The material is introduced into this cylinder without being pressed, and the cover is laid on. By means of twine the cover is fastened to the place where it lays. The size of the cylinder depends upon the capacity of the still. In fitting the cylinder, care must be taken that the material is only in such quantity that it is covered at least three inches high by the water in the still when the cylinder is inserted in the boiler which happens when the water in the still boils.

When the material is thus introduced into the already boiling water, the decomposing action of ferments contained therein on the other constituents is prevented, from which decomposition products would be produced whose formation must not be permitted. We know by the treatment described that bitter almonds afford no bitter almond oil, and mustard no mustard oil. It is of importance in the investigation of the distillate to prevent the formation of volatile products from the non-volatile constituents of the material. But independently of the volatile decomposition products which could be formed when the directions mentioned are not observed, decompositions occur which would give rise to erroneous

* The subject of this treatise is of great practical importance to the scientific Pharmaceutist, and we purpose giving the whole of the work, which is of no great extent, in a succession of articles, the translation of which from the German, is made by Mr. Wm. Bastick.—ED. *Phar. Journ.*

deas of the composition of the substance under examination in the investigation, of its watery decoction, because there are in many plants bodies, besides ferments, which are broken up into two or more non-volatile products when they are long in contact with water and ferments. This is the case when the material is placed in cold water and then heated to the boiling point, which occupies a longer time the greater the quantities of material and water that are to be raised to the boiling point. The root of the rubia tinctorum is an example of this kind, which contains a peculiar ferment by which ruberythric acid in the presence of a ferment is decomposed into alizarine and sugar, when the comminuted root is placed in cold water and then heated to the boiling point. On the contrary, when the divided root is introduced into boiling water, the ruberythric acid remains unchanged and dissolves in the water, while the ferment is converted into an inactive condition.

With materials which contain easily oxidizable constituents it may be readily perceived that by the introduction of the substances into boiling water their oxidation takes place in a much smaller degree than by being immersed in cold water and subsequently heated. The decoctions which are obtained according to the method here recommended are on that account generally much paler than those produced by gradual heating.

When the substance to be extracted has been sufficiently long in contact with the boiling water, and no more volatile products can be detected in the distillate, in case such have been formed therein at the commencement of distillation, the operator, after the neck has been removed, withdraws the cylinder with its contents, places it on a capacious dish or basin to catch the droppings, and presses the material in a press between two vertical plates. The decoction is filtered, whilst hot, through paper. To prevent it cooling while being filtered, as large a number of funnels as are necessary should be employed. If, in consequence of the liquid cooling, anything should be separated by the filter which had been previously dissolved, the filtration must be performed by means of a hot water funnel. From a watery decoction of the flower-buds of capparis spinosa, the quercitrine, or the so-called rutinic acid, is precipitated by cooling in voluminous flocks. The distillate thus obtained is either pure water, in those cases where the substance under examination did not contain bodies distillable with the vapour of water, or such as are not in a free condition but in the form of non-volatile compounds, or there are volatile bodies dissolved therein or suspended with others. The distillate is then either clear when the volatile substances are readily soluble in the water distilled over with them, or are present in very small quantity, or it is turbid from suspended undissolved substances which exist in the fluid either in the form of oily globules, or crystals, but seldom in the form of flocks. More frequently, when the material contains a considerable quantity of volatile substances which are not readily soluble in water, an oily film swims on the surface of the distillate, or collects at the bottom of the liquid. The volatile bodies which may be dissolved or suspended in the distillate belong often to the most different classes of bodies. Volatile bases, volatile acids, hydrocarbons, indifferent volatile oils containing oxygen, aldehyde, compound ethers, may be contained in such a distillate. It is a rare case for only one volatile substance to be found by a close examination of the distillate. If the substance under examination contains only small quantities of volatile substances, recourse must be had to cohobation. When a portion of the material has been treated in the manner directed, and a sufficient quantity of the distillate has been obtained to point out by means of a preliminary examination to what classes of bodies the volatile substances found therein belong, it may be easily determined whether cohobation is necessary or not. Assuming there were only volatile acids or volatile bases contained in the distillate, a cohobation would be superfluous even when their quantity was very small.

The treatment of the watery decoction and the watery distillate for the purpose of ascertaining their constituents, the next section will describe.

II.—*Treatment of the material to be examined with cold water.*

A portion of the material, as finely divided as possible, is treated with cold water. As much water is employed as will thoroughly saturate the material, and cover it about a couple of lines. After a short time, the saturated mass is placed upon a fine strong piece of linen, and the liquid pressed off by gradually increased force. The liquid thereby obtained is filtered through moist paper, in as many small filters as possible. In most cases the liquid passes slowly through the filters. By this method

of treatment it is not possible to prevent the formation of decomposition products by the action of the ferment on the other constituents. As all these decompositions proceed with more difficulty in proportion to the lowness of the temperature, this disadvantage may be considerably removed by employing ice-cold water for the extraction, and by preventing the heating of the filtering liquid by surrounding the funnels with such water. The filtrates should be collected in vessels surrounded with cold water.

The further investigation of this filtered liquid will be described in the next section. It serves principally for the detection of those substances which remain undissolved by the treatment of the material with boiling water, because they become by elevated temperatures insoluble in water, that is coagulated, as is the case with bodies analogous to albumen, emulsine, &c.

III.—*Treatment of the substance to be examined with acidulated water.*

A portion of the material is treated with water, to which a little sulphuric acid has been added, and heated in a water-bath, or by a current of steam. The boiling hot fluid, together with the material previously placed therein, is allowed to cool, and the fluid is separated from the undissolved material, which is then gently expressed. This fluid serves chiefly to detect some few organic acids which are contained in the material, in the form of salts insoluble in water and alcohol, but which are set free by the sulphuric acid, and thereby become soluble in water; and also to show the presence of organic bases, which are contained in the form of sulphates in this extract.

IV.—*Treatment of the material to be examined with ammoniacal water.*

For the preparation of the extract with water to which a little caustic ammonia has been added, a small quantity of the residue is taken which is obtained after boiling the material with water and expressing it. This residue is introduced into water containing ammonia, and the whole allowed to stand quietly some time, until the liquid has properly saturated the substance. After passing the liquid through linen and expressing the substance, the liquid is filtered through paper. This fluid is suitable for the detection therein of some bodies which are soluble in alkaline liquids, but not in water or dilute acids. Only when the addition of dilute hydrochloric acid produces a precipitate in this fluid is it prepared on a larger scale for the further examination of the precipitate. When no precipitate results, it is no longer employed for the investigation.

V.—*Treatment of the material to be examined with alcohol.*

Whether alcohol containing more or less water is employed for the extraction of the material, whether the extraction should be conducted at an ordinary temperature or at a boiling heat, depends on the properties of the material to be extracted. The operator must first convince himself whether a considerable quantity of fat is present or not. It is easy to ascertain this with certainty. The extraction of a small quantity of the material with ether, and the evaporation of the ether, proves this. It may be readily observed whether the residue, after the evaporation of the ether, contains much fat or not. When the material contains only a very little fat, the alcohol should be applied boiling hot for the extraction. In this case a spirit of .825 sp. gr. should be employed. If a great quantity of the fat is present in the material, which is the case when by expression between cold or heated plates the chief bulk of the fat is separated, weaker spirit of specific gravity, between .850 and .855 must be employed, and the extraction performed at an ordinary temperature.

Should the material be treated with hot alcohol, and a large quantity be operated upon, a still is the best for this purpose which is provided with an inner receptacle for the material and the alcohol. The heat employed is that of a water-bath. When the head of the still is affixed, and proper care taken for cooling the distillate, but little alcohol is lost, because its vapour is condensed. If volatile substances exist in the material, they pass over simultaneously with the spirit. Easy as it is to separate volatile acids or bases from the spirit, it is equally difficult to remove volatile oils therefrom. Such alcohol is constantly again and again used for the extraction of a fresh quantity of the same material; in the worst cases it can be employed for combustion, &c. When the spirit has acted sufficiently long on the material to be extracted, the head of the still is removed, and the receptacle and its contents together withdrawn from the still, then the liquid is strained through linen, and the material is expressed by slowly increased pressure. The alcoholic decoction is filtered while

hot through paper, and placed aside to cool, whereby frequently bodies separate which are more difficultly soluble in cold than in hot spirit. The extraction of the material with cold alcohol is conveniently performed in a bottle with a very wide mouth, which is furnished with a glass stopper well ground in. It should be of such dimensions that materials to be introduced should almost fill it when loosely inserted therein. It is better to employ several small bottles instead of one large one. Into these bottles the quantity of material is introduced necessary to fill them, the material is covered with spirit, and the completely filled bottles closed with glass stoppers. After standing 24 or 36 hours in a moderately warm place, the spirit is poured off. As far as possible this filtered extract is preserved in a stoppered bottle quite full, and the material is treated with a fresh quantity of spirit, which is allowed to remain on the material for examination 24 hours. The extract thus obtained is employed for the extraction of a second quantity of material instead of fresh spirit. The extracted material is taken from the extracting vessel and expressed; the expressed fluid is treated in the same way as that obtained by pouring off. In this manner suitably concentrated extracts are obtained. As in Robiquet's glass apparatus for extraction a little material can only be introduced at once, and on account of the danger of its breakage when operating with hot alcohol, I use an extraction apparatus of tinned iron plate for the extraction of large quantities of the substance for examination with cold alcohol, or the extraction of smaller quantities with hot alcohol, with which it is not worth the trouble to employ a still. This apparatus is so arranged, that it permits the employment of hot or cold alcohol with equal facility. The apparatus consists of two concentric cylinders joined together, which are about eighteen inches high. The diameter of the inner cylinder is from four to five inches, and the diameter of the outer one double that size. Both cylinders are fastened together below by an horizontal ring of tinned iron plate. The inner cylinder projects about an inch below. This projection passes through a ring which is fixed to a funnel. When the funnel is fastened by its spout to a filter stand, it is only necessary to fix the funnel to the apparatus for extraction firmly in a vertical position. The inner cylinder is closed at the bottom with a finely perforated plate. The space between the two cylinders can be filled with water at any required temperature. From a flask closed with a perforated cork, through which passes a glass tube twice bent at right angles, steam is conducted into the water between the cylinders. Any required temperature can be obtained during the time of extraction by regulating the heat under the flask, and thus regulating the current of steam. To prevent the evaporation of the alcohol added to the material which fills the inner cylinder, into the hole at the bottom of which has been inserted a loose layer of cotton wool, the cylinder is closed with a tin cover, but not hermetically tight. When the space between the two cylinders has been filled with hot water, it is closed with a circular cover, which has a perforation to admit the steam tube to the water. It is evident that this tube must reach nearly to the bottom of the vessel. To be able to empty the water conveniently which is placed between the cylinders, a small cock is attached to the external cylinder at the bottom of its outer edge. When the extraction is conducted in this apparatus, the alcoholic extract passing through the material is poured back several times on the mass undergoing extraction, to increase the period of contact. When the extract appears sufficiently concentrated, it is placed aside, and a fresh quantity of alcohol employed for the further extraction. The latter weak tincture is used instead of pure spirit for the extraction of a fresh portion of the material, so as to render the extract as strong as possible.

The further treatment of the alcoholic extract, whether prepared at ordinary temperatures or by heat, will be described in the next section.

VI.—*Treatment of the material to be examined with ether.*

The treatment of the material with ether is effected at ordinary temperatures in Robiquet's glass apparatus for extraction, or with large quantities in such an apparatus made of larger dimensions of tinned iron plate. In many cases it is necessary to treat the material to be extracted with ether previously to macerating it in alcohol. This is the case when free fatty acids are contained in the substance under examination. These acids are even dissolved out with other bodies by the exhaustion of the material with cold alcohol containing water. To surmount this

disadvantage, these fatty acids must be removed by treatment with ether. In fresh materials, the presence of free fatty acids can seldom be detected. On the contrary, in substances which have been kept a long time, they can be frequently recognized. In these cases the fatty acids result from the decomposition of the fats contained in the fresh material.

VII.—*Treatment of the material to be examined with alcohol containing a small quantity of ammonia or potash.*

For this purpose a small quantity of the material is taken, and one portion is macerated with alcohol containing potash, and another with alcohol containing ammonia. The alcohol contains sufficient alkali when to an ounce of the spirit six or eight drops of a concentrated aqueous solution of potash or ammonia have been added. This operation must be performed in well stoppered bottles, which must be quite full of the material, but lightly packed. The alkaline spirit is poured in until the bottle is full up to the stopper, which is then closed. By the admission of the air an oxidation of the dissolved bodies would easily result. After standing several hours undisturbed, the contents of the bottle are placed on a linen filter and gently pressed. The fluid is mixed at once with as much hydrochloric acid as will render it slightly acid, and it should be observed whether a precipitate is produced in consequence or not. When no precipitate results, no further proceedings are taken; on the contrary, should there be a precipitate, a larger quantity of the material must be treated in the manner described. The method of further examining these solutions will be given in the next section.

(*To be continued.*)

ON LIGHTHOUSE ILLUMINATION—THE ELECTRIC LIGHT.

BY PROFESSOR FARADAY, D.C.L., F.R.S.

Substance of a Lecture delivered at the Royal Institution.

The use of light to guide the mariner as he approaches land, or passes through intricate channels, has, with the advance of society and its ever increasing interests, caused such a necessity for means more and more perfect, as to tax to the utmost the powers both of the philosopher and the practical man, in the development of the principles concerned, and their efficient application. Formerly the means were simple enough; and if the light of a lantern or torch was not sufficient to point out a position, a fire had to be made in their place. As the system became developed, it soon appeared that power could be obtained, not merely by increasing the light but by directing the issuing rays: and this was in many cases a more powerful and useful means than enlarging the combustion; leading to the diminution of the volume of the former, with, at the same time, an increase in its intensity. Direction was obtained, either by the use of lenses dependent altogether upon refraction, or of reflectors dependent upon metallic reflexion; and some ancient specimens of both were shown. In modern times the principle of total reflexion has also been employed, which involves the use of glass, and depends both upon refraction and reflexion. In all these appliances much light is lost: if metal be used for reflexion, a certain proportion is absorbed by the face of the metal; if glass be used for refraction, light is lost at all the surfaces where the ray passes between the air and the glass; and also in some degree by absorption in the body of the glass itself. There is, of course, no power of actually increasing the whole amount of light, by any optical arrangement associated with it.

The light which issues forth into space must have a certain amount of divergence. The divergence in the vertical direction must be enough to cover the sea from the horizon, to within a certain moderate distance from the shore, so that all ships within that distance may have a view of their luminous guide. If it have less, it may escape observation where it ought to be seen; if it have more, light is thrown away which ought to be directed within the useful degree of divergence: or if the horizontal divergence be considered, it may be necessary so to construct the optical apparatus, that the light within an angle of 60° or 45° shall be compressed into a beam diverging only 15°, that it may give in the distance a bright flash having a certain duration instead of a continuous light,—or into one diverging only 5° or 6°,

which, though of far shorter duration, has greatly increased intensity and penetrating power in hazy weather. The amount of divergence depends in a large degree upon the bulk of the source of light, and cannot be made less than a certain amount, with a flame of a given size. If the flame of an argand lamp $\frac{7}{8}$th of an inch wide, and $1\frac{1}{2}$ inches high, be placed in the focus of an ordinary Trinity House parabolic reflector, it will supply a beam having about 15° divergence: if we wish to increase the effect of brightness, we cannot properly do it by enlarging the lamp flame; for though lamps are made for the dioptric arrangement of Fresnel, which have as many as four wicks, flames $3\frac{1}{2}$ inches wide, and burn like intense furnaces, yet if one be put into he lamp place of the reflector referred to, its effect would chiefly be to give a beam of wider divergence; and if to correct this, the reflector were made with a greater focal distance, then it must be altogether of a much larger size. The same general result occurs with the dioptric apparatus; and here, where the four-wicked lamps are used, they are placed at times nearly 40 inches distant from the lens, occasioning the necessity of a very large, though very fine, glass apparatus.

On the other hand, if the light could be compressed, the necessity for such large apparatus would cease, and it might be reduced from the size of a room to the size of a hat: and here it is that we seek in the electric spark, and such-like concentrated sources of light, for aid in illumination. It is very true, that by adding lamp to lamp, each with its reflector, upon one face or direction, power can be gained; and in some of the revolving lights, ten lamps and reflectors unite to give the required flash. But then not more than three of these faces can be placed in the whole circle; and if a fixed light be required in all directions round the lighthouse nothing better has been yet established than the four-wicked Fresnel lamp in the centre of its dioptric and catadioptric apparatus. Now, the electric light can be raised up easily to an equality with the oil lamp, and if then substituted for the latter, will give all the effect of the latter; or by expenditure of money it can be raised to a five or tenfold power, or more, and will then give five or tenfold effect. This can be done, not merely without increase of the volume of the light, but whilst the light shall have a volume scarcely the 2000th part of that of the oil flame. Hence, the extraordinary assistance we may expect to obtain of diminishing the size of the optical apparatus and perfecting that part of the apparatus.

Many compressed intense lights have been submitted to the Trinity House; and that corporation has shown its great desire to advance all such objects and improve the lighting of the coast, by spending, upon various occasions, much money and much time for this end. It is manifest that the use of a lighthouse must be never failing, its service ever sure; and that the latter cannot be interfered with by the introduction of any plan, or proposition, or apparatus, which has not been developed to the fullest possible extent, as to the amount of light produced,—the expense of such light,—the wear and tear of the apparatus employed,—the steadiness of the light for 16 hours,—its liability to extinction,—the amount of necessary night care,—the number of attendants,—the nature of probable accidents,—its fitness for secluded places, and other contingent circumstances, which can as well be ascertained out of a lighthouse as in it. The electric spark which has been placed in the South Foreland High Light, by Professor Holmes, to do duty for the six winter months, had to go through all this preparatory education before it could be allowed this practical trial. It is not obtained from frictional electricity, or from voltaic electricity, but from magnetic action. The first spark (and even magnetic electricity as a whole) was obtained 28 years ago. (Faraday, *Philosophical Transactions*, 1832, p. 32.) If an iron core be surrounded by wire, and then moved in the right direction near the poles of a magnet, a current of electricity passes, or tends to pass, through it. Many powerful magnets are therefore arranged on a wheel, that they may be associated very near to another wheel, on which are fixed many helices with their cores, like that described. Again, a third wheel consists of magnets arranged like the first; next to this is another wheel of the helices, and next to this again a fifth wheel, carrying magnets. All the magnet-wheels are fixed to one axle, and all the helix wheels are held immovable in their place. The wires of the helices are conjoined and connected with a commutator, which, as the magnet-wheels are moved round, gathers the various electric currents produced in the helices, and sends them up through two insulated wires in one common stream of electricity into the lighthouse

lantern. So it will be seen that nothing more is required to produce the electricity than to revolve the magnet-wheels. There are two magneto-electric machines at the South Foreland, each being put in motion by a two-horse power steam-engine; and, excepting wear and tear, the whole consumption of material to produce the light is the coke and water required to raise steam for the engines, and carbon points for the lamp in the lantern.

The lamp is a delicate arrangement of machinery, holding the two carbons between which the electric light exists, and regulating their adjustment; so that whilst they gradually consume away, the place of the light shall not be altered. The electric wires end in the two bars of a small railway, and upon these the lamp stands. When the carbons of a lamp are nearly gone, that lamp is lifted off and another instantly pushed into its place. The machines and lamp have done their duty during the past six months in a real and practical manner. The light has never gone out, through any deficiency or cause in the engine and machine-house: and when it has become extinguished in the lantern, a single touch of the keeper's hand has set it shining as bright as ever. The light shone up and down the Channel, and across into France, with a power far surpassing that of any other fixed light within sight, or anywhere existent. The experiment has been a good one. There is still the matter of expense and some other circumstances to be considered; but it is the hope and desire of the Trinity House, and all interested in the subject, that it should ultimately justify its full adoption.

ON THE DIETETIC AND MEDICINAL PROPERTIES OF ERYTHROXYLON COCA.

BY DR. MANTEGAZZA.

(Prize Essay. Pamphlet. Milan, 1859.)

The Erythroxylon Coca, a plant which grows in moist and woody regions on the eastern slopes of the Andes, is highly valued by the inhabitants of Peru, Chili, and Bolivia, not only as a medicine, but also as an article of food; and serves with them as a substitute for the tea, coffee, betel, tobacco, haschisch, and opium used by other nations. Its culture, upon which, since the time of Pizarro's conquest, much care has been bestowed, has recently increased to such a degree, that in the year 1856 the revenue of the Republic of Bolivia, from the sale of this herb, amounted to thirteen millions of francs—a very large sum, if compared with the small number of consumers (800,000). According to the account of M. Pöppig and of other well-known travellers, the natives use the dried leaves of the coca-plant either by themselves or in combination with a highly-alkaline substance called *llipta*, which is prepared from roasted potatoes and the ashes of different other plants; they masticate them like the Malays and the inhabitants of the Indian Archipelago do the calcined leaves of the clavica betle. The use of this masticatory, which is considered a great delicacy, is not, however, confined to the rich; on the contrary, it is particularly among the hard-working Indians that the coca enjoys a high reputation as a nutriment and restorative, and its use is considered absolutely essential for the endurance of fatigue and exertion, so that a labourer in making his contract has a view not only to wages, but to the amount of coca to be furnished. The Inca, who lives at a height of seven to fifteen thousand feet above the level of the sea, and whose meagre fare consists principally of maize, some dried meat, and potatoes of bad quality, believes that he can sustain his strength solely by the use of coca; the porter who carries the mail, and accompanies the traveller over the roughest roads at the quick pace of the mule, invigorates and strengthens himself by chewing coca; the Indian who works half naked in the silver and quicksilver mines, looks upon this plant as an ambrosia capable of imparting new life, and of stimulating to new exertions. It is not surprising, under such circumstances, that this article should be very much abused, and that the evil of intemperance in the use of coca, known as coquear, should be quite as prevailing among the natives of those districts as intemperance in the use of tobacco, alcoholic liquors, and opium is among other nations. They often intoxicate themselves for several weeks, hide in the deepest forests in order not to be disturbed in their enjoyment, and not rarely return home to their family suffering from delirium or decided idiocy.

The child and the feeble old man seize with equal eagerness the leaves of the wonderful herb, and find in it indemnification for all suffering and misery. Be it

that the praised efficacy of the plant is merely the effect of fancy or tradition, or that the plant really contains a powerful principle unknown to science, the solution of this mystery is certainly a worthy theme for scientific inquiry, and the investigations of Dr. Mantegazza deserve, therefore, our full attention.

Dr. Mantegazza observed that the chewing of a drachm of the leaves of the coca increased salivation, giving at first a somewhat bitter, and afterwards an aromatic taste in the mouth, and a feeling of comfort in the stomach, as after a frugal meal eaten with good appetite. After a second and third dose, a slight burning sensation in the mouth and pharynx, and an increase of thirst, were noticed; digestion seemed to be more rapidly performed, and the fæces lost their stercoraceous smell, the peculiar odour of the juice of the coca becoming perceptible in them. On using the coca for several days, the author observed on himself as well as on other individuals a circumscribed erythema, an eruption around the eyelids resembling pityriasis; from time to time a not unpleasant pricking and itching of the skin was felt. An infusion of the leaves, taken internally, was found to increase the frequency of the pulse in a considerable degree. In making observations on the frequency of the pulse, the author was very careful to consider all the conditions which might influence it; he found that the temperature of the air being the same, and the liquids being heated to an equal degree, an infusion of coca will increase the action of the heart four times its normal standard, while cocoa, tea, coffee, and warm water only double it. By taking an infusion prepared from three drachms of the leaves a feverish condition was produced, with increased heat of the skin, palpitation of the heart, seeing of flashes, headache, and vertigo; the pulse rose from seventy to one hundred and thirty-four. A peculiar roaring noise in the ear, a desire to run about at large, and an apparent enlargement of the intellectual horizon indicated that the specific influence upon the brain had commenced. A peculiar, hardly describable feeling of increased strength, agility, and impulse to exertion follows; it is the first symptom of the intoxication, which is, however, quite different from the exaltation produced by alcoholics. While the latter manifests itself by increased but irregular action of the muscles, the individual intoxicated by coca feels but a gradually augmented vigour, and a desire to spend this newly-acquired strength in active labour. After some time the intellectual sphere participates in this general exaltation, while the sensibility seems to be hardly influenced; the effect is thus quite different from that produced by coffee, and resembles in some degree that of opium. Dr. Mantegazza could, in this excited condition, write with ease and regularity. After he had taken four drachms he was seized with the peculiar feeling of being isolated from the external world, and with an irresistible inclination to gymnastic exercise, so that he who in his normal condition carefully avoided the latter, jumped with ease upon the writing-table without breaking the lamp or other objects upon it. After this a state of torpidity came on, accompanied by a feeling of intense comfort—consciousness being all the time perfectly clear—and by an instinctive wish not to move a limb during the whole day, not even a finger. During this sensation sleep sets in, attended by odd and rapidly changing dreams; it may last a whole day without leaving a feeling of debility or indisposition of any kind. The author increased the dose to eighteen drachms in one day; his pulse rose in consequence of it to one hundred and thirty-four, and in the moment when delirium was most intense, he described his feelings to several of his colleagues, who observed him, in the following written words: "*Iddio è ingiusto perche ho fatto l'uomo incapace di poter vivere sempre cocheando*" (this is the expression for intoxication by coca). "*Io preferiscta una vita di* 10 *anni con coca che un di* 1,000,000 *secoli senza coca.*" After three hours of sleep Dr. Mantegazza recovered completely from this intoxication, and could immediately follow his daily occupation without the least indisposition—on the contrary, even with unusual facility. He had abstained for forty hours from food of any kind, and the meals then taken were very well digested. From this fact, the author finds it explainable that the Indians employed as carriers of the mail are able to do without food for three to four days, provided they are sufficiently supplied with coca.

From these experiments made repeatedly on himself, and on other individuals, Dr. Mantegazza draws the following conclusions:—

1. The leaves of the coca, chewed or taken in a weak infusion, have a stimulating effect upon the nerves of the stomach, and thereby facilitate digestion very much.
2. In a large dose coca increases the animal heat and augments the frequency of the

pulse, and consequently of respiration. 3. In a medium dose, three to four drachms, it excites the nervous system in such a manner that the movements of the muscles are made with greater ease—then it produces a calming effect. 4. Used in a large dose it causes delirium, hallucinations, and finally congestion of the brain.

The most prominent property of coca, which is hardly to be found in any other remedy, consists in the exalting effect it produces, calling out the power of the organism without leaving afterwards any sign of debility. The coca is in this respect one of the most powerful nervines and analeptics. These experiments, as well as the circumstance that the natives have used the coca, from the earliest period, as a remedy in dyspepsia, flatulency, and colic, have induced Dr. Mantegazza, and several of his colleagues in South America and Europe, to employ the leaves of the coca in a variety of cases, partly as masticatory, partly in powder, as infusion, as alcoholico-aqueous extract in the dose of ten to fifteen grains in pills, and as clyster. Dr. Mantegazza has used coca with most excellent results in dyspepsia, gastralgia, and entralgia; he employed it not less frequently in cases of great debility following typhus fever, scurvy, anæmic conditions, &c., and in hysteria and hypochondriasis, even if the latter had increased to weariness of life. The coca might also be employed with great benefit in mental diseases where some physicians prescribe opium. Of its sedative effect in spinal irritation, idiopathic convulsions, nervous erethism, the author has fully convinced himself. He proposes its use in the highest dose in cases of hydrophobia and tetanus. It is a popular opinion that the coca is a reliable aphrodisiac; the author has, however, observed only two cases in which a decided influence upon the sexual system was perceived.

Dr. Mantegazza, finally, recommends this remarkable plant, which could be easily introduced into trade, to the profession for further physiological and therapeutical experiments, and adds the full history of eighteen cases by which the medicinal virtues of the remedy are proved to satisfaction.—(*Oesterreichische Zeitschrift für Praktische Heilkunde*, November 4, 1859.)

METROPOLITAN WATERS IN 1860.

The following table, showing the comparative purity of the Metropolitan waters, is taken from Dr. Robert Dundas Thomson's Report. The composition of a well water containing sewage is appended for the sake of comparison.

	Total Impurity per gallon.	Organic Impurity per gallon.
	Grs., or °.	Grs., or °.
Distilled water	0.0	0.0
Loch Katrine water, new supply to Glasgow	3.32	0.96
Well at Sandgate	40.96	5.20
Thames Companies:—Chelsea	19.84	1.44
Southwark	19.76	1.52
Lambeth	19.20	1.68
Grand Junction	20.00	1.60
West Middlesex	19.04	1.36
Other Companies:—New River	20.93	1.92
East London	22.55	2.00
Kent	22.80	2.24

POISONING BY ARSENIC.

A case of poisoning by a servant girl, which proved fatal to one person, and very nearly occasioned the death of several others, was investigated on Wednesday, May 16th, before Mr. John Gregory, the coroner for the county of Leicester. On the 4th of May, Mr. Samuel Wells, an elderly man, and a farmer, at Seagrave, a village about eight miles from Leicester, died after a week's illness, under circumstances which led to a suspicion that he had been poisoned by his servant girl, named Hannah Holmes. She was accordingly taken into custody, and remanded by the magistrate at Loughborough, before whom she was brought. The following is a brief abstract of the evidence taken before the coroner:—

Henry John Wells deposed that the deceased was his father, and he knew the girl Hannah Holmes. On the 26th of April she came to his house, and said she had

been sent by her master for some offal wheat and some arsenic, which he wanted to poison sparrows and rats with, and which witness had previously promised to send him. He gave her accordingly some offal wheat and a quarter of a pound of arsenic, which he had purchased of Mr. Astill, an oil and colourman, of Loughborough. It was labelled "Poison, Beware." Some little time after his wife gave him back the packet, saying Hannah Holmes had given it to her. He weighed it, and found an ounce and a half had been taken out, upon which he remarked, "Enough has been taken to poison all Seagrave."

Ann Wells, wife of the last witness, stated that on the 26th ult. she called at the house of the deceased on her way from Loughborough market, and took tea there. She saw the deceased take some of the arsenic out of the packet on the point of a knife, and mix it with some wheat in a basin of water. He then tied up the packet again, and gave it to her to take home.

Mary Jane Wells, a daughter-in-law of the deceased, who with her husband lived with him, deposed that on the 27th ult. he ordered the girl Holmes to make him some gruel, which it seems it was his custom to take before going to bed. She did so, and he began to eat it, but afterwards remarked that he could not get through it, and directed her to take it away. He was seized with violent vomiting soon after, which continued through the night. He refused to have any medical aid, but the next morning a surgeon named Downey was sent for, who gave him some medicine. During the next day he was apparently better. In the afternoon witness noticed that several of the chickens were dying. In the evening she ordered the girl Holmes to make some gruel for her master, which she did; but as he did not eat it immediately, witness said she would eat it herself, which Holmes earnestly dissuaded her from doing. She also, against the girl's urgent remonstrance, gave some to her little boy, seven years of age. Both she and the boy felt a smarting sensation in the mouth after tasting a spoonful, more than which they did not take, owing to its having a disagreeable taste; and the prisoner fetched them some beer, telling them to wash out their mouths. The gruel was thrown away. Her husband then came home, and on being told of the sensations she and the child had experienced, remarked that he believed there was poison in the oatmeal of which the gruel was made. The boy was soon after taken with violent sickness, and after going to bed witness herself suffered in the same manner, and Mr. Downey, the surgeon, was fetched. The sickness continued through the night, and in the morning both were better, but witness was very thirsty for several days afterwards. The girl Holmes had been often reproved by her master, and had sometimes said to witness she wished one person in the world was dead.

James Wells, husband of the last witness, gave corroborative evidence.

Patrick Downey, surgeon, of Sileby, detailed some particulars of the illness of the deceased, from which he died. During life some of the ordinary symptoms of poisoning by arsenic were absent, but he made a *post-mortem* examination, the result of which convinced him that death was occasioned by arsenic. He accordingly delivered the stomach of deceased, together with a portion of oatmeal, some of the matter vomited by Mrs. Wells, and some dead chickens, which had been placed in his hands by the last witness, into the custody of the police.

Mr. Joseph Goddard, Pharmaceutical Chemist, Leicester, stated that on April 30th he received a packet of oatmeal, and a bottle labelled "Vomit by Mrs. Wells," with a request to analyze each, to see if they contained any poison, as it was suspected that arsenic was present. He commenced with the oatmeal, using the usual tests for arsenic, but failed to discover any of that poison. He then ate a portion of the oatmeal, and gave one ounce of it to a fowl, without producing any ill effects. He then examined a portion of the vomit, and did not succeed, in the first instance, in obtaining any indication of arsenic, but on afterwards concentrating it to about one-fourth the bulk, he obtained indications of arsenic by Reinsch's process. He then commenced the examination of the fowl, and submitted the contents of the stomach, gizzard, &c., to the action of Marsh's and of Reinsch's tests, each of which yielded distinct arsenical results. Witness subsequently received a jar containing manure, two dead chickens, also three jars, labelled, containing part of the liver, intestines, with the stomach and its contents, of the deceased. These were carefully submitted to a similar series of experiments, and found to yield abundant proof of arsenic. The arsenious acid obtained by Reinsch's process was examined under the microscope,

and found to show the octahedron form of crystal peculiar to arsenious acid. A portion of these crystals was afterwards dissolved, and tested with ammonio-nitrate of silver, and ammonio-sulphate of copper; the former giving the yellow precipitate of arsenite of silver, and the latter arsenite of copper, or Scheele's green.

Superintendent Hayne, of the county constabularly, deposed that he went to the house of the deceased during his illness, and was told by him that he suspected the girl Holmes of having poisoned him. He took her into custody upon the charge, which she strongly denied. While in the lockup at Loughborough she wrote a letter, which witness opened. It was addressed to her father and mother, and contained a confession that she had poisoned her master, and hoped to be forgiven for it. She several times remarked that she did it, but why she did it she did not know.

Holmes, who was present during the whole of the inquiry, having been duly cautioned by the coroner, stated that she was guilty of administering the poison, but did not intend to kill her master.

The jury then returned a verdict of "Wilful Murder" against Hannah Holmes, who was committed on the coroner's warrant to take her trial at the next assizes.

The coroner, in summing up, commented very strongly upon the fact that the arsenic, the remainder of which was produced at the inquest, was sold in an uncoloured state. The law required that arsenic sold in smaller quantities than 10 lbs. should be coloured with indigo or soot, and the seller who did not comply with that requirement was liable to a fine of £10. He thought, if ever there was a case in which legal proceedings ought to be taken, this was one.

Proceedings have been commenced against Messrs. Astill and Co., oil and colourmen, of Loughborough, for having sold the arsenic in an uncoloured state, contrary to the provisions of the Arsenic Act.

POISONING BY STRYCHNINE.

On Wednesday, April 25th, Mr. Edward Coxwell, the borough coroner, concluded an adjourned investigation at the Crown and Sceptre Inn, Bevois-valley, a suburb of Southampton, into the circumstances attending the death of Elizabeth Harrison, aged 26. The deceased came from Somerton, near Glastonbury, and had lived in service in Dorsetshire, and latterly at Mr. Coventry's, near Southampton; but for three weeks prior to her death she had lived with a friend, Mrs. Cross, at 12, Bevois-valley. On Friday night, the 13th of April, she went out with Henry Grey, who was the gardener at Mr. Coventry's while she resided there; they went to the Uncle Tom's Cabin beerhouse, remained there some time, and at a late hour of the night Grey accompanied her as far as the Bevois Castle Inn, where he left her, believing that she would go to Cross's, and she promised to meet him next morning. She did not go to Cross's house until next morning early, when she stated that she had slept with the landlord's daughter at the Uncle Tom's Cabin. This was not the fact. She met Grey at 6 o'clock in the morning, told him that she would go and get her breakfast, and then she went to Mr. Cross's; after which she met Grey at a quarter past 8 o'clock, and accompanied him to Cracknore Hard, on the opposite side of the Southampton Water. They remained at Cracknore Hard some time, and had some refreshment; and, on their return, Grey walked through Southampton with the girl, who, when they parted, asked him if he was going to be married to a young woman with whom he had been keeping company. He told her that he thought he should, and the tears were observed to run down her face, and she said that she thought she had better not call and see him any more. She proceeded to Mrs. Cross's in Bevois-valley, and after washing herself came down stairs; when suddenly she complained of violent pains in her head. Mrs. Cross gave her a cup of tea; she became worse, and shrieked "Good God! what can they have given me?" She was assisted to bed, and was attended by Mr. and Mrs. Cross, and by a nurse (Mrs. Thomas). She said she should die, unless she were sick, and appeared particularly anxious that Mrs. Cross should not take for vinegar something in a cup which she had used in cleaning her teeth. She took some antimonial wine, and Mr. Lawrence, the surgeon who was called in, administered an emetic, but all remedies were in vain, and, after a series of tetanic spasms, the poor girl died. On the day after her death, Mrs. Cross and Mrs. Thomas made an examination of the girl's apartment and boxes. The cup above mentioned was found to have in it a white sediment, and in one of her boxes was a small bottle, containing a white powder, which, on being subjected to the ordinary test, proved to

be strychnia. An analysis was made of the stomach, &c., by Dr. Osborn and Mr. Lawrence, who found strychnia in the stomach, the liver, and the duodenum; and the poison extracted from the viscera, on being administered to a kitten and to a frog, caused death in a very short time, with all the tetanic symptoms of poisoning by strychnia. The coroner said, as to the cause of death there could be little doubt, and scarcely less doubt that the girl had died by her own hand; at the same time, the jury had no conclusive evidence before them which would lead them to the fact. His impression was, that the evidence brought before them would lead to the conclusion that although the deceased had died by poison—that is to say, strychnia—there was not sufficient evidence to show by whom it was administered. Of course, if they were clearly of opinion that she had destroyed herself, their verdict would be that she had wilfully taken the poison; at the same time, there was just that want of evidence to prevent the jury returning a verdict that she had died by poison administered by her own hand. The jury returned the following verdict:—"We find that the deceased, Elizabeth Harrison, came by her death by the administration of strychnia; but by whom administered there is no evidence to show. We should much wish the police to find out where the bottle and its contents were purchased."

POISONING BY STRYCHNINE.

An inquest has been held at Peterborough, to inquire into the death of a young woman, 18 years of age, named Mary Jane Pope, who on Sunday, May 6, attended the Baptist chapel, and during the service was taken ill, lost the use of her legs, and was convulsed. Being removed home, a surgeon was sent for, and afterwards a physician. Both these gentlemen came to independent conclusions that the girl had been poisoned. She, however, denied having taken anything. Death ensued in a short time after the seizure, and the symptoms of the attack and the rigidity which set in directly after death confirming the suspicions of poisoning, an inquest was held. The *post-mortem* examination strengthened the opinion of the medical gentlemen, and led them to conclude that she had died from the effects of strychnine. It was ascertained that on Saturday deceased purchased sixpennyworth of Battle's vermin powder, but no motive for suicide seemed to exist. From the evidence given to the jury, it appears that in 1854 an infant of the same family died suddenly of convulsions, that in April last another child died after a short illness, showing similar symptoms, and that a few days previously a boy, 8 years of age, was seized with convulsions exactly corresponding to those under which the deceased girl laboured, but prompt medical assistance being obtained, he recovered. Under these circumstances, the coroner and jury submitted the intestines and other portions of the body of Mary Pope to Dr. Letheby for analysis, and the inquest was adjourned for a week.

The result of Dr. Letheby's analysis has been the discovery of strychnine in sufficient quantity to cause death. He also found a preparation of zinc in the contents of the stomach, such as would result from the administration of sulphate of zinc. No further evidence having been obtained, the inquest closed with the verdict that deceased came by her death by strychnine, but by whom or how it was administered, there is no evidence to show.

PEPPER ADULTERATION CASES.

Ten informations were heard at the Police Court, on Saturday, against retail grocers in Liverpool, for selling adulterated pepper. The cases were tried before Messrs. Raffles, Castellain, Booth, and Houghton. Mr. Welsby and Mr. Tindall appeared for the prosecutor, and Mr. Mansfield for nine of the defendants. On the suggestion of Mr. Welsby, it was agreed that, after proving the fact, seeing that the circumstances were the same in all the cases, the whole question should be taken on one.

Mr. Welsby, in opening the case for the Board of Inland Revenue, observed that the 22nd section of the 59th George III., chap. 53, imposed a penalty of £100 upon every person who, amongst other things, was found guilty of selling pepper which had been adulterated. The present prosecutions were against sellers of pepper in this town; and he thought it right to state, that it was not sought for one moment to impute deliberate fraud to those parties in thus selling this adulterated article. It would be proved that they had purchased the pepper from a house of

considerable extent in the town, and the main object of the present prosecution was to obtain facilities of discovering by whom, and the manner in which, this fraud, which had been very considerable, had been committed. He believed the result would be such as to leave no doubt whatever that in every one of the instances of the purchases of pepper the samples had been found to contain adulterating ingredients, generally consisting of the husks of the mustard seed, and in some instances of the seed of the capsicum and cereal starch. There could be no doubt that the parties before their honours had been made the victims of a gross fraud, and that fraud had been committed in so deliberate a manner, and to such an extent, as made it the bounden duty of the Board of Inland Revenue to prosecute the guilty parties.

The case of Joseph Boadle, 234, Mill Street, was then taken.

Thomas Middleton said he was supervisor of excise for that district, and went in company with Mr. Weir, on the 24th of January last, and purchased at the shop of Mr. Boadle a quantity of black and white pepper, telling the seller at the same time who he was, and for what purpose he came. The samples were marked before they left the shop, and were afterwards divided into three portions and sent to London.

Robert Williamson was assistant chemist to the Board of Inland Revenue in London. He received, in the month of January last, samples of pepper from Mr. Middleton. He had six years' experience, and was well acquainted with the subject. He examined the samples in question by the aid of the microscope. With respect to the samples marked "Boadle," he found that the black pepper was adulterated to the extent of five per cent. with mustard husks, and one per cent. of cereal starch. The white pepper contained eight per cent. of mustard husks. The mustard husk was an article of no commercial value. It was a kind of chaff from the mustard manufactory. In the sample marked "Henry Boote," the black pepper contained five per cent. of mustard husks, and one per cent. cereal starch—the white pepper six per cent. of white mustard husks. In the sample marked "John Parry," the white pepper contained eight per cent. of mustard husks. In the sample marked "Henry Middleton," the black pepper contained five per cent. of mustard husks, and one per cent. of cereal starch; the white pepper purchased from this shop was genuine. In the sample marked "John Dear," the black pepper contained five per cent. mustard husks, and one per cent. cereal starch; and the white pepper eight per cent. mustard husks. In the sample marked "Henry Cowan," the black pepper contained five per cent. of mustard husks, and one per cent. of cereal starch; tho white pepper, in this case, was genuine. In the sample marked "Samuel Hughes," the black pepper contained three per cent. mustard husks, and a small amount of cereal starch. In the sample marked "Charles Pickin," the black pepper contained three per cent. mustard husks, and one per cent. cereal starch. In the sample marked "Thomas Gilbert," the white pepper contained eight per cent. mustard husks. In the sample marked "Isaac and Henry Smith," the black pepper contained five per cent. mustard husks, and one per cent. cereal starch. In the sample marked "Thomas Aylward," the black pepper contained five per cent. mustard husks, and one per cent. cereal starch. The mustard husks were very finely ground—he believed they must have been ground between stones. They were ground so finely that an ordinary person would be unable to detect their presence in the pepper. He considered the adulteration had been skilfully done.

John Weir was chemical officer to the Board of Inland Revenue. He went along with Mr. Middleton to the different shops. He corroborated the previous witness as to the extent of the adulteration, and further stated that he had found capsicum in all the black pepper. They did not regard that, however, as adulteration.

Professor Archer, professor of botany at Queen's College, and secretary to the Liverpool Microscopical Society, stated the result of a microscopical examination of the specimens. In each case he had found clear and unmistakable evidence of the admixture of mustard husks, capsicum seed, and cereal starch. He first prepared them by washing, and viewed the milky fluid through the microscope; the granules of starch were then distinctly visible. He then applied iodine as a reagent, and found the granules of starch gave the well-known violet coloured reaction. They were also of considerable size, and altogether different in shape to the well-known starch peculiar to pepper. He did not think any scientific person could possibly mistake the cereal starch for the pepper starch, if his scientific investigations had been specially addressed to such examinations. He thought it equally clear that

the parts of mustard and pepper could be positively defined. He was of opinion that this admixture of spurious ingredients took place at the time of grinding. The various ingredients were too intimately mingled to admit of their having been mixed by hand, or by any other mode of mixing after the grinding.

George Phillips, principal chemist to the Board of Inland Revenue, said he had not had time to estimate the exact quantity, but found mustard husks and cereal starch in all. He thought the whole had been well sifted together—by the wholesale dealer, of course. He had no doubt it was a wilful and premeditated adulteration.

Dugald Campbell, consulting chemist to the Brompton Museum, gave evidence to the same effect as the previous witnesses.

Dr. Lankester had examined most carefully the samples sent him, and found mustard husks and cereal starch in all. His per-centages very closely corresponded with those of the previous witnesses.

Dr. John Lindley could not speak as to the extent to which the adulteration had been carried; but the quantity discoverable would be about five per cent.—there might be more. In reply to a question as to whether the adulterating substances might not have become mixed up with the pepper accidentally, the doctor said that nothing less than an earthquake in Liverpool could have brought about such an accident. (Laughter.)

Mr. Middleton was recalled, and proved that he had bought quantities of pepper from Joseph Boadle, 234, Mill Street, who said it had been bought from Messrs. Wright and Crossley; also from Samuel Hughes, 10, St. James's Place, Henry Boote, 34, Mill Street, and Charles Pickin, 132, Mill Street. He might say that both Mr. Boote and Mr. Pickin charged the wholesale price. He had also purchased from Isaac and Henry Smith, Mill Street, and Thomas Aylward, 14, St. James's Place. As far as his recollection carried him, each one said he had purchased the pepper from Messrs. Wright and Crossley.

George Barton proved he had bought quantities of pepper from Henry Middleton, John Dear, and John Parry.

William H. Johnstone bought some pepper from Henry Cowan, Great Howard St.

Mr. Mansfield, in addressing the court on behalf of the defendants, said that the prosecution did not attempt to show that there was anything like fraud or misconduct on the part of the defendants, but merely sought to establish that they had sold an adulterated article. They had had that day a great body of scientific evidence, and that evidence completely coincided in a manner most remarkable—all agreeing as to the amount of per-centage in the adulteration. That this adulteration was the work of one hand, and one hand only, there could be no doubt. The retail dealers all declared that they had no part in the adulteration. And, on the other hand, the evidence could only point to one conclusion—that it took place in the hands of the wholesale dealer from whom they had obtained the pepper. It had also been shown to the court that there was no attempt made at concealment by any of the defendants. There could not be the slightest doubt that the defendants had been made the victims of a very gross fraud. He trusted that, considering the view which had been taken by his learned friend who had opened the case for the Crown, and the peculiarly hard position in which the defendants stood, the court would be pleased to inflict a very light penalty. He would now call upon the defendants to state the circumstances under which they had bought the pepper.

Mr. Welsby said his learned friend could not do so according to law.

Mr. Raffles said that by law Mr. Mansfield could not, and he thought it was a great grievance that the defendants could not do so.

Mr. Welsby said he did not impute any moral fraud to the defendants. He did not impute even personal negligence to them. They had bought an article from a house in Liverpool considered to be of great respectability, and from whom they had every reason to believe a genuine article could be got. These were facts now patent to every person in that court, and he did not think that the hardships of their case would be carried further. If the bench came to the conclusion that the case had been established, he was perfectly willing, on the part of the Crown, that they should inflict the least possible penalty.

Mr. Henry Cowan, one of the defendants not represented by Mr. Mansfield, said that perhaps it would be as well to show where the pepper was purchased.

John Holland was shopman to Mr. Cowan. He remembered this pepper having been purchased. He had never anything in the shop to mix with the pepper. He

never had any mustard husks. He never saw anything of the kind, and it could not be in the shop without his knowledge. He did not know personally from whom the pepper was bought; he thought it was from Messrs. Johnson and M'Gowan.

Mr. M'Gowan said he was in the court, if the bench wished to ask him any questions. He acknowledged he had sold the pepper to the defendant Cowan, who was his customer, but he had previously purchased it of Messrs. Wright, Crossley, & Co.

It was ruled that this was not evidence.

Some desultory conversation ensued, and the stipendiary declared that the bench were unanimous in their opinion as to the hardness of the case upon the defendants, whom they would therefore fine the lowest sum the law permitted them—namely, £25 each; and he, on behalf of himself and Mr. Castellain, who was present with him on the previous occasion, regretted much that they had not then, as now, the advantage of such valuable scientific evidence.

BOOKS RECEIVED.

The Management of Infancy, Physiological and Moral. Intended chiefly for the Use of Parents. By Andrew Combe, M.D., &c., &c. Ninth Edition. Revised and Edited by Sir J. Clark, Bart., M.D., F.R.S., &c. Edinburgh: Maclachlan & Stewart. London: Simpkin, Marshall, and Co. 1860. 8vo pp. 302. (From the Editor.)

Notes on the Dispatch of Troops by Sea. By Charles J. Kirwan, Esq., L.R.C.S.I. Thacker, Spink, and Co., Calcutta and London. 1859.

Cattle Cookery. By W. Burness.

Glycerin and Cod Liver Oil; *their History, Introduction, Therapeutic Value, and Claims upon Professional and Public Attention.* To which is added a Chapter on Physic-Taking; or Counsels for the Sick. By W. Burnham Willmott, Associate of the Pharmaceutical Society, &c. London: H. Baillière, Regent Street, and 440, Broadway, New York. 1860.

TO CORRESPONDENTS.

The Jacob Bell Memorial Fund.—Our correspondent will find, from the list published this month, that satisfactory progress is being made in the direction specified, the fine arts and literature being represented by Sir Charles Eastlake, President of the Royal Academy, Sir Edwin Landseer, R.A., F. R. Lee, Esq., R.A., W. M. Thackeray, Esq., and Charles Dickens, Esq. It is thus obvious that the interest felt in the proposed object, and the esteem entertained for our late President, have not been confined to our own profession.

A Subscriber (Woolwich).—The failure in the electrotype process alluded to was most likely caused by the imperfect coating of the object with black lead.

R. A. P. S. (Brighton).—(1.) The books named would answer the purpose. (2.) Yes. (3.) This would be subject to the arrangements of the establishment in which the apprentice is engaged.

A Correspondent (Watford) is informed that "Wetheral's Brown Salve" may be obtained from Messrs. E. and A. Bowden, 13, Charles Street, St. James's.

M. P. S. (Leicester).—*Benzoated Zinc Ointment.* Vol. xiv., page 207.

J. F. T. (Birmingham).—In the directions of the London College for making Decoctum Cinchonæ, the quantity of strained decoction is not defined, but it would be incorrect to make up with water the loss caused by boiling.

Pharmacy (London).—A list of the names of those dentists who have passed the examination in Dental Surgery, is published from time to time in the *Times*, and in the Medical Journals. We believe the number who have already passed to be about eighty.

W. W. (Newcastle).—*Sheep Dipping Mixtures.* Our correspondent will find, on reference to vol. xviii., pages 511, 524, and 559, that the subject has not been overlooked.

E. M. (Lower Tooting).—The mixture referred to would become dark in colour from the action of the iron on the tannin in the decoction of bark.

NOTICE.—The Index is unavoidably omitted from the present Number, and will be given in that for July.

Instructions from Members and Associates, respecting the transmission of the Journal, before the 25th of the month, to the Secretary, Elias Bremridge, 17, Bloomsbury Square, W.C.

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